



# Service Manual

## A-series Tray Trolley

**PHILIPS**

**Assembleon**  
Integrated electronics manufacturing solutions

Document . . . . .	<b>Service Manual, A-series Tray Trolley</b>
Based on . . . . .	-
Order number . . . . .	4022 593 51241
Supplied with. . . . .	PA 2681/XX

HISTORY					
ISSUE	DATE	ORDER NUMBER	REVISION CODE	STATUS	RELEASE DOCUMENT
First issue	January 2007	4022 593 51241	07.01	Current	DI-A-series-011

Assembléon Customer Services maintains a customer site on the internet. This site provides the latest technical updates via downloadable Service Informations (SI's) and manual updates via downloadable Documentation Informations (DI's). Subscribe first to access this information. Therefore complete the Access Request Form on the Assembléon website in its entirety.

The Assembléon website:

*[www.assembleon.com/techsupportsite](http://www.assembleon.com/techsupportsite)*

#### **FEEDBACK CHANNEL:**

Send comments on this document to:

*[documentation.feedback@philips.com](mailto:documentation.feedback@philips.com)*

Add the order number and revision code of this document with your comments.  
This information is visible at the bottom of each page.

© A s s e m b l é o n N e t h e r l a n d s B V

All rights reserved. No part of this book may be reproduced in any form, by print, photoprint, microfilm or any other means without the written permission from Assembléon.

## H. TRAY TROLLEY

### Table of Contents

<b>CHAPTER H1</b>	<b>Introduction</b>	<b>H-7</b>
<b>CHAPTER H2</b>	<b>Safety and ergonomics</b>	<b>H-8</b>
<b>CHAPTER H3</b>	<b>Technical specifications</b>	<b>H-9</b>
H3.1	Tray trolley, identification	H-9
<b>CHAPTER H4</b>	<b>Functional description</b>	<b>H-10</b>
H4.1	Tray trolley, overview	H-10
H4.1.1	Tray lift	H-10
H4.1.2	Puller	H-11
H4.1.2.1	Snap-in function	H-13
<b>CHAPTER H5</b>	<b>Trouble shooting</b>	<b>H-14</b>
H5.1	Trouble shooting work flow	H-14
H5.2	Diagnosis trees and tables	H-14
H5.2.1	Diagnosis trees, conventions	H-14
H5.2.2	Tray trolley, homing and initialising fault tracing	H-15
H5.2.2.1	Encoder in tray trolley defective	H-15
H5.2.2.2	Encoder cable in tray trolley defective	H-16
H5.2.2.3	Tray trolley controller defective	H-16
H5.2.2.4	EPD sensor in tray trolley misaligned	H-16
H5.2.2.5	EPD sensor in tray trolley defective	H-16
H5.2.2.6	EPD wiring in tray trolley defective	H-17
H5.2.2.7	Cable between tray trolley controller and motor defective	H-17
H5.2.2.8	Motor in tray trolley defective	H-17
H5.2.3	Tray trolley, carrier select problems	H-18
H5.2.3.1	Sensor B08,B09 defective	H-18
H5.2.3.2	Sensor B08, B09 misalignment	H-18
H5.2.4	Tray trolley, carrier de-select and storage problems	H-19
H5.2.5	Tray trolley, general faults	H-20
H5.2.6	Tray trolley, misalignment of the lift	H-21
H5.3	Reference information	H-26
H5.3.1	Tray trolley controller, LED status check	H-26
H5.3.2	Tray trolley controller, connections	H-27
H5.3.3	Tray trolley, sensors and switches, overview	H-28
H5.4	Diagrams	H-30

H5.4.1	Tray trolley, diagram. . . . .	H-30
<b>CHAPTER H6 Measurement, adjustment and calibration . . . . . H-31</b>		
H6.1	Tray trolley, height adjustment . . . . .	H-32
H6.2	Tray trolley, connecting with extension cable. . . . .	H-34
H6.3	EPD B01 puller in stock area, adjustment . . . . .	H-35
H6.4	EPD B02, puller safe / puller zero coarse adjustment. . .	H-37
H6.5	Tray carrier sensor B03, B04 adjustment . . . . .	H-39
H6.6	Laser B05, sensor storage in tray trolley, adjustment. . .	H-40
H6.7	EPD B06 in tray trolley, adjustment . . . . .	H-42
H6.8	Tray trolley lift, checking the offset between the lift EPD (B06) and the lift motor encoder zero fine . . . . .	H-44
H6.9	Laser B07, sensor storage in tray trolley, adjustment. . .	H-46
H6.10	Light sensor B08, B09, carrier detection adjustment . . .	H-47
H6.11	Snap-in zero coarse EPD B10 adjustment for 'lock' position . . . . .	H-54
H6.12	Puller catch pin parallelism adjustment. . . . .	H-55
H6.13	Lift in tray trolley alignments . . . . .	H-56
H6.13.1	Parallelism between puller-arm and lift-assy, adjustment. . . . .	H-56
H6.13.2	Front-back misalignment. . . . .	H-57
H6.13.3	Left-right misalignment . . . . .	H-58
H6.13.4	One corner misalignment . . . . .	H-58
H6.13.5	Shifted in X or Y direction. . . . .	H-59
H6.13.6	Rotated around the z-axis. . . . .	H-59
H6.13.7	Final check. . . . .	H-59
H6.14	Puller arm tip, height adjustment. . . . .	H-60
H6.15	Lift stops in tray trolley, adjustment. . . . .	H-61
H6.16	Lift Lock spring, adjustment . . . . .	H-63
H6.17	Vertical lift belt, adjustment . . . . .	H-64
H6.18	Drive belt of tray trolley lift, adjustment. . . . .	H-65
H6.19	Puller motor timing belt, adjustment . . . . .	H-66
H6.20	Tray trolley, calibrating. . . . .	H-67
H6.20.1	Log off procedure . . . . .	H-75
H6.20.2	Read flash prom calibration values . . . . .	H-76
<b>CHAPTER H7 Maintenance instructions . . . . . H-77</b>		
H7.1	Required Equipment. . . . .	H-77
H7.1.1	Required Maintenance Tray trolley . . . . .	H-78
H7.2	Belts in tray trolley, checking . . . . .	H-80
H7.3	Tray trolley sensors, cleaning. . . . .	H-82
H7.4	Safety contacts in tray trolley, cleaning . . . . .	H-83



**CHAPTER H8 Installation and replacement instructions . . . . . H-85**

H8.1	Tray trolley, replacement instructions . . . . .	H-85
H8.0.1	Tray trolley, spares . . . . .	H-86
H8.1	Tray trolley controller, replacement. . . . .	H-90
H8.2	Puller motor, replacement. . . . .	H-91
H8.3	Lift motor of tray trolley, replacement . . . . .	H-94
H8.4	Snap-in motor, replacement . . . . .	H-102
H8.5	Drive belt of tray trolley lift, replacement . . . . .	H-104
H8.6	Puller motor timing belt, replacement. . . . .	H-107
H8.7	Vertical timing belt in tray trolley, replacement . . . . .	H-108
H8.8	Cranck puller, replacement . . . . .	H-110
H8.9	Puller catch pin, replacement . . . . .	H-111
H8.10	Contact pins on tray trolley, replacement . . . . .	H-112
H8.11	Trolley interface board, replacement. . . . .	H-113
H8.12	Control LED's on tray trolley, replacement . . . . .	H-114
H8.13	Driver board of puller motor, replacement . . . . .	H-115
H8.14	Safety interlock in tray trolley, replacement. . . . .	H-116
H8.15	EPD B01, B02 in tray trolley, replacement . . . . .	H-117
H8.16	Tray carrier sensor B03, B04, replacement . . . . .	H-118
H8.17	Laser B05, sensor storage in tray trolley, replacement . .	H-119
H8.18	EPD B06 in tray trolley, replacement. . . . .	H-120
H8.19	Laser B07, storage in tray trolley, replacement. . . . .	H-122
H8.20	Light sensors B08,B09 in tray trolley, replacement . . .	H-124
H8.21	EPD B10 in tray trolley, replacement. . . . .	H-125
H8.22	Foot switch of tray trolley, replacement . . . . .	H-126
H8.23	Wheels under tray trolley, replacement . . . . .	H-127

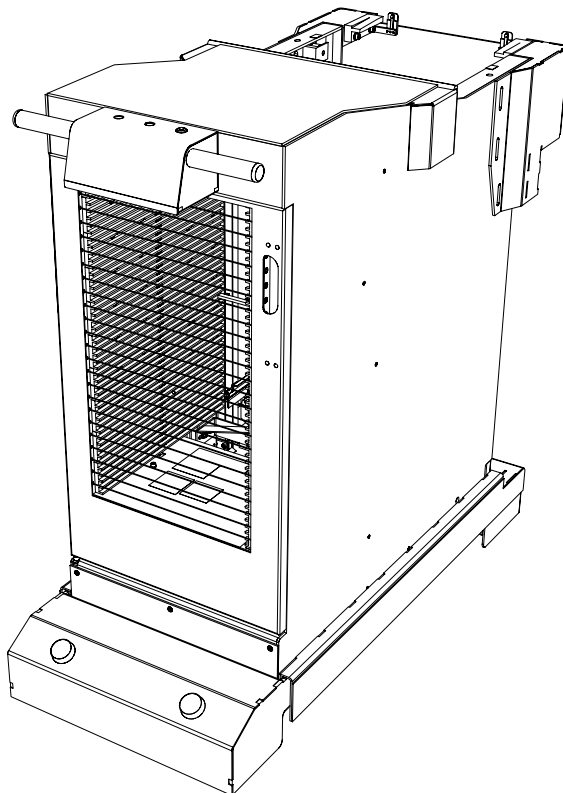
H0-00000.fm



## CHAPTER H1 Introduction

The tray trolley is a cart that forms the interface between components and the machine. Components are placed on trays stored in the tray trolley. The tray trolley is mounted on the base.

This part of the manual also covers the trolley lift cover, because it uses the same interface on the base.



*Figure 1*    *Tray trolley*

## CHAPTER H2 Safety and ergonomics

The trolleys are part of the whole machine.

Safety and ergonomics are also described for the machine as a whole.



HEAVY OBJECT ( $\pm 200$  kg)  
Improper lifting method may cause injury.  
Use proper tools to lift the object.

CHAPTER H3 Technical specifications

H3.1 Tray trolley, identification

The trolley identification plates are located inside the trolley.

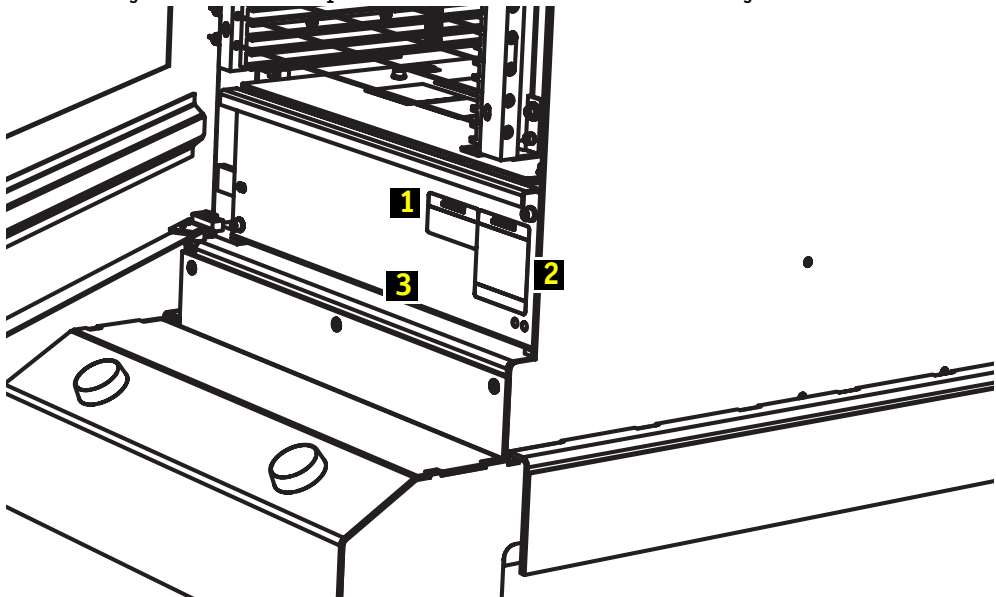


Figure 2 Identification plates on the A-series tray trolley

No.	Description	Format
1	Technical identification	12 digit number, last digit marked at bottom of sticker.
2	Commercial identification	6 digit PA-number: 2681/00 6 digit DC-number.
3	Service identification	5 digit M-number.

Figure 3 Identification plates on A-series tray trolley

H3-00001.fm

## CHAPTER H4 Functional description

### H4.1 Tray trolley, overview

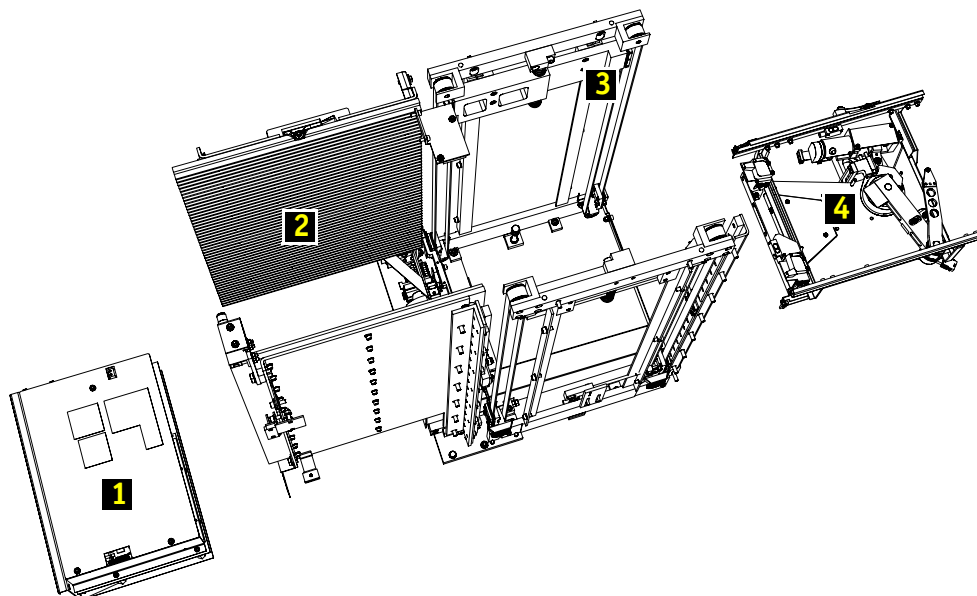


Figure 4 Tray trolley overview

1. Tray trolley controller cabinet
2. Tray carrier slots
3. Tray trolley lift
4. Tray lift.

#### H4.1.1 Tray lift

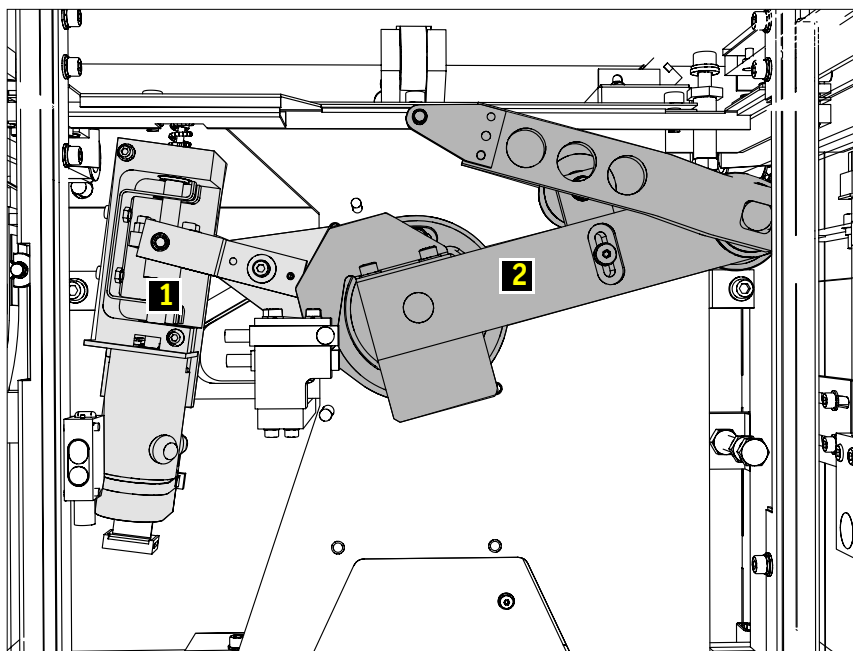


Figure 5 Tray trolley lift

The tray lift moves tray carriers, in vertical direction, up to pick-up level and back to the tray carrier slots. It utilises a servo-motor with a brake for machine safety.

H4-00001.fm

The servo system uses a zero\_coarse EPD and an encoder for the homing action. The encoder produces 500 pulses per revolution and, counting the edges gives 2000 increments per revolution.

The pick-up level is related to the placement level of the system. The level is calibrated by the TTC with the assistance of an EPD and encoder. The TTC searches for a reference level on the trolley base by moving the lift slowly upwards starting at the zero point.

### H4.1.2 Puller

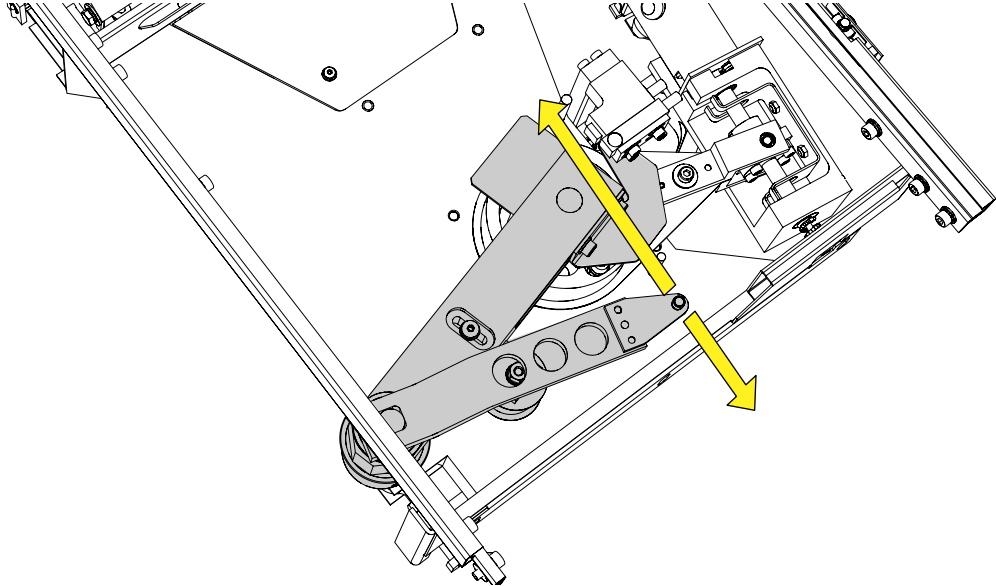


Figure 6 Puller

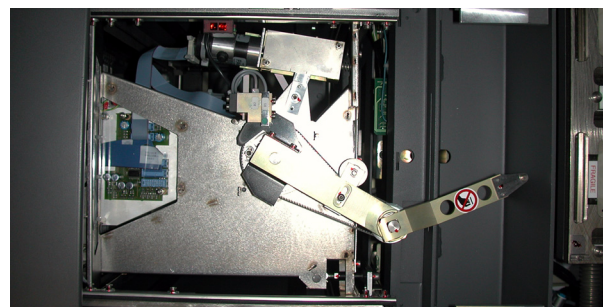
The puller moves a tray carrier through the tray trolley in horizontal direction. It utilizes a servo-motor with a brake, the servo-motor position is maintained stable by servo position control.

The servo system uses a zero\_coarse EPD and an encoder for the homing action. The encoder produces 500 pulses per revolution and, counting the edges gives 2000 increments per revolution. At the end of the stroke, one revolution of the motor moves the puller 9 mm. The resolution and positioning of the puller catch pin is dependent on the position of the pin, at the end of the stroke the resolution is 4 mm.

Five puller positions are defined:

#### 1. Pick

- The puller is at the end of stroke at the side of the work area, at this position a component may be picked from the selected tray.



H4-00001.fm

## 2. Lift

- The puller is in a position in which the selected tray carrier is on the lift while the lift can move without restriction (50 mm).

## 3. Park

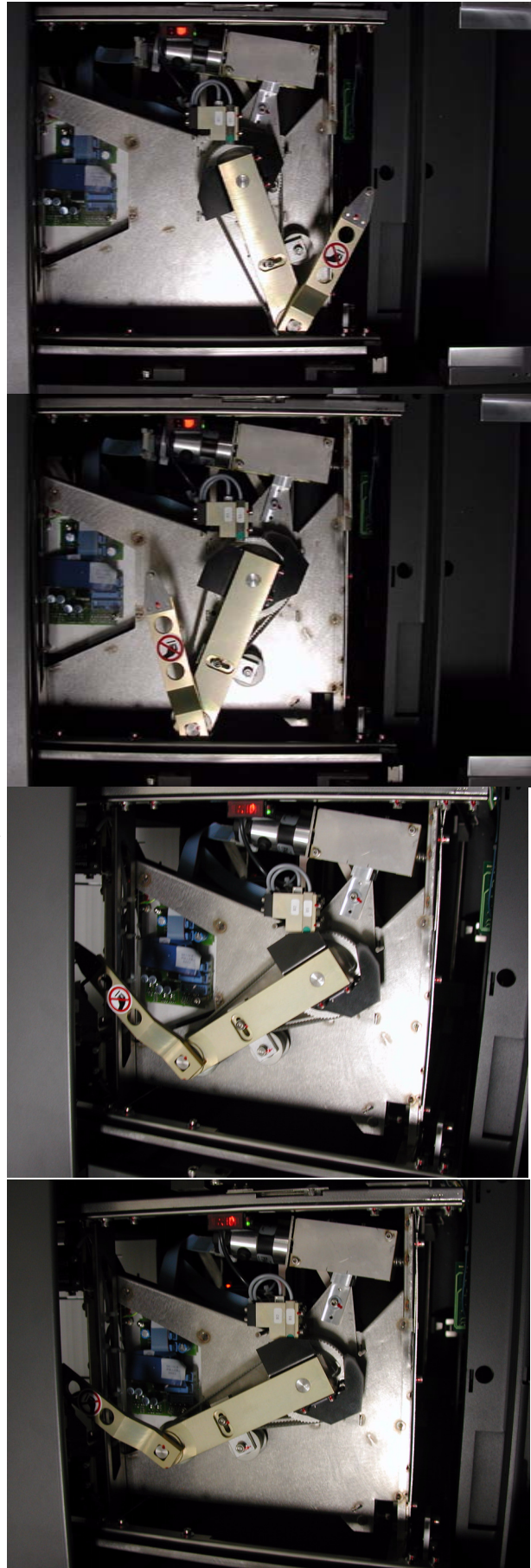
- The puller is at the side of the magazine in a position where the lift can move without restriction. There is no carrier on the lift.

## 4. Hook (snap-in)

- The puller is at the position where a tray carrier can be released or hooked-on by moving the snap-in mechanism.

## 5. Eject

- The puller is at the end of stroke at the side of the tray carrier. At this position the tray carrier is ejected (empty).



H4-00001.fm



#### H4.1.2.1 Snap-in function

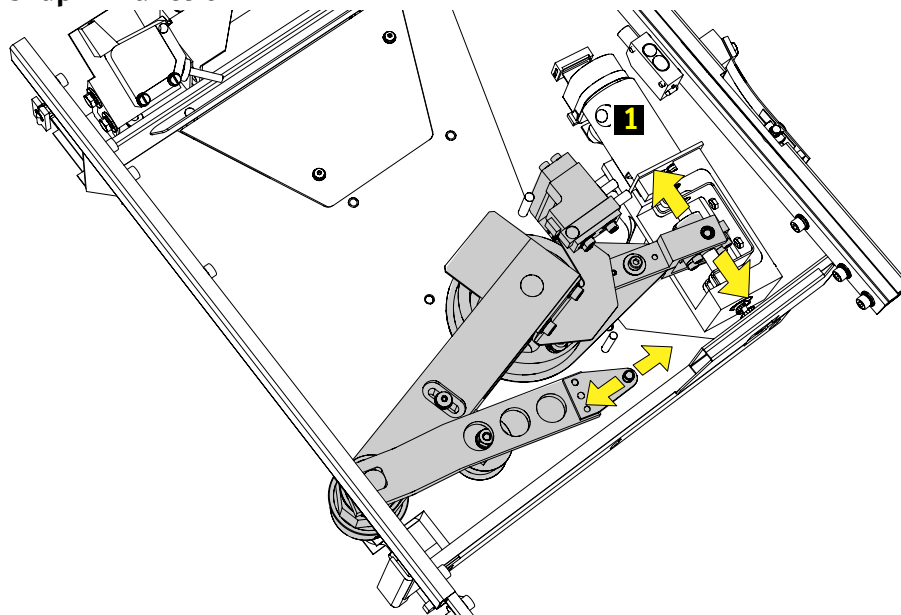


Figure 7 Snap-in mechanism

The snap-in mechanism is servo controlled and connects the carrier to the puller. All movements are done by components of the puller.

## **CHAPTER H5 Trouble shooting**

### **H5.1 Trouble shooting work flow**

### **H5.2 Diagnosis trees and tables**

#### **H5.2.1 Diagnosis trees, conventions**

## H5.2.2 Tray trolley, homing and initialising fault tracing

When homing and initialising the tray trolley, the following functions will be checked in this sequence:

	Check	When?
1	Checking servo systems	After power up
2	Look for EPD snap-in (B10)	After power up
3	Look for zero fine snap-in (encoder)	After power up
4	Snap-in to lock position (2)	After power up and every time the servo has been reset
5	Look for EPD lift (B06)	After power up
6	Look for zero fine lift (encoder)	After power up
7	Look for EPD puller (B02)	After power up
8	Look for zero fine puller (encoder)	After power up
9	Carrier present on lift (B03,B04)	After power up and every time the servo has been reset

Figure 8 Tray trolley, homing and initialising sequence

These checks can result in one of the following errors:

Error on screen				Corrective action
Feedback error (axis)	Unexpected error	Zero course not found (axis)	Zero fine not found (axis)	
X	-	-	X	H5.2.2.1.Encoder in tray trolley defective
?	?	?	?	H5.2.2.2.Encoder cable in tray trolley defective
X	-	-	-	H5.2.2.3.Tray trolley controller defective
-	-	X	-	H5.2.2.4.EPD sensor in tray trolley misaligned (B02, B06 or B10)
-	X	-	-	H5.2.2.5.EPD sensor in tray trolley defective (B02, B06 or B10)
X	-	-	-	H5.2.2.6.EPD wiring in tray trolley defective (B02, B06 or B10)
X	-	X	-	H5.2.2.7.Cable between tray trolley controller and motor defective
X	-	X	-	H5.2.2.8.Motor in tray trolley defective

Figure 9 Tray trolley, homing and initialising, errors

### H5.2.2.1 Encoder in tray trolley defective

#### ■ Encoder of lift motor defective

- Move lift manually and check zero fine with the encoder test tool.
- EPD (B06): **H6.7 EPD B06 in tray trolley, adjustment**
- Zero fine:
- Check offset between course and fine, see **H6.8 Tray trolley lift, checking the offset between the lift EPD (B06) and the lift motor encoder zero fine**

#### ■ Encoder of snap-in defective

- Move snap-in manually and check zero fine with the encoder test tool.
- EPD (B10): **H6.11 Snap-in zero coarse EPD B10 adjustment for 'lock' position**

- Zero fine:
- Encoder of puller arm defective
  - Move snap-in manually and check zero fine with the encoder test tool.
  - EPD (B02): [H6.4 EPD B02, puller safe / puller zero coarse adjustment](#) , [H6.3 EPD B01 puller in stock area, adjustment](#)
  - Zero fine:

#### H5.2.2.2 Encoder cable in tray trolley defective

- Encoder cable lift motor defective
  - Check voltages, for zero fine use the encoder test tool.
  - EPD (B06): replace cable
  - Zero fine: replace cable
  - Adjustment of sensor, see [H6.7 EPD B06 in tray trolley, adjustment](#)
- Encoder cable snap-in defective
  - Check voltages, for zero fine use the encoder test tool.
  - Zero course (B10): replace cable
  - Zero fine: replace cable.
  - Adjustment of sensor, see [H6.11 Snap-in zero coarse EPD B10 adjustment for 'lock' position](#)
- Encoder cable puller arm defective
  - Check voltages, for zero fine use the encoder test tool.
  - Zero course (B02): replace cable
  - Zero fine: replace cable.
  - Adjustment of sensor, see [H6.4 EPD B02, puller safe / puller zero coarse adjustment](#) , [H6.3 EPD B01 puller in stock area, adjustment](#)

#### H5.2.2.3 Tray trolley controller defective

- Defective controller card
  - Check the LED settings, see [H5.3.1 Tray trolley controller, LED status check](#)
- Defective fuse on piggy board
  - Location and type of the fuse, see [H5.3.1 Tray trolley controller, LED status check](#)
  - Check by measuring the resistance of the fuse.

#### H5.2.2.4 EPD sensor in tray trolley misaligned

- check adjustment of zero course sensors
  - B02, see [H6.4 EPD B02, puller safe / puller zero coarse adjustment](#) , [H6.3 EPD B01 puller in stock area, adjustment](#)
  - B06, see [H6.7 EPD B06 in tray trolley, adjustment](#)
  - B10, see [H6.11 Snap-in zero coarse EPD B10 adjustment for 'lock' position](#)

#### H5.2.2.5 EPD sensor in tray trolley defective

- Check the sensors B02, B06 or B10
  - Location of sensor, see [H5.3.3 Tray trolley, sensors and switches, overview](#)
  - Check them manually. Keep a piece of paper in front of the sensors to check if there is a beam.

H5-00002.fm

#### H5.2.2.6 EPD wiring in tray trolley defective

- Check the sensors B02, B06 or B10
  - **B02:** Check the voltage of point 5 off connector X2 on the bottom of the lift, see?
  - **B06:** Check the voltages of points 1,11 and 20 of connector block X2 on the bottom of the lift.
  - **B10:** Check the voltages of point 10 of connector block X2 on the bottom of the lift.
  - Replace wiring if necessary.

#### H5.2.2.7 Cable between tray trolley controller and motor defective

See [H5.2.2.8.Motor in tray trolley defective](#)

#### H5.2.2.8 Motor in tray trolley defective

- Lift motor defective
  - Check voltages on point 1,2 and 3 of connector block X5
- Snap-in motor defective
  - Check voltages on point 1,2,3,4 and 5 of connector block X1
- Puller motor defective
  - Check voltages on point 1,2 and 3 of connector block X1

### H5.2.3 Tray trolley, carrier select problems

Error on screen			Corrective action
Carrier not present	Unable to get carrier	Wrong snap-in position	
X	-	-	<a href="#">H5.2.3.1.Sensor B08,B09 defective</a>
X	-	-	<a href="#">H5.2.3.2.Sensor B08, B09 misalignment</a>
X	-	-	Defective sensor wiring (B08 and/or B09)
X	-	-	Damaged reflecting spots in the tray carrier
X	X	-	Lift out of alignment
X	-	-	No carrier present in selected position
-	X	-	Carrier in the ejected position
-	X	-	Defective sensor (B04)
-	X	-	Defective sensor wiring (B04)
-	X	-	Misalignment of puller arm assy
-	X	-	Damaged puller tip
-	-	X	Defective sensor (B10)
-	-	X	Defective sensor wiring (B10)
-	-	X	Misalignment sensor (B10)

Figure 10 Errors and causes

#### H5.2.3.1 Sensor B08,B09 defective

##### ■ Check sensor(s)

- B08: Check voltage on point 4 off connector X2 (20V).
- B09: Check voltage on point 6 off connector X2 (20V).
- If defect, replace sensor. See [H8.20 Light sensors B08,B09 in tray trolley, replacement](#)

#### H5.2.3.2 Sensor B08, B09 misalignment

##### 1. Check sensor(s)

- Check adjustment of the sensor(s), see [H6.10 Light sensor B08, B09, carrier detection adjustment](#)

## H5.2.4 Tray trolley, carrier de-select and storage problems

H5-00007.fm

## H5.2.5 Tray trolley, general faults

H5-00008.fm



## H5.2.6 Tray trolley, misalignment of the lift

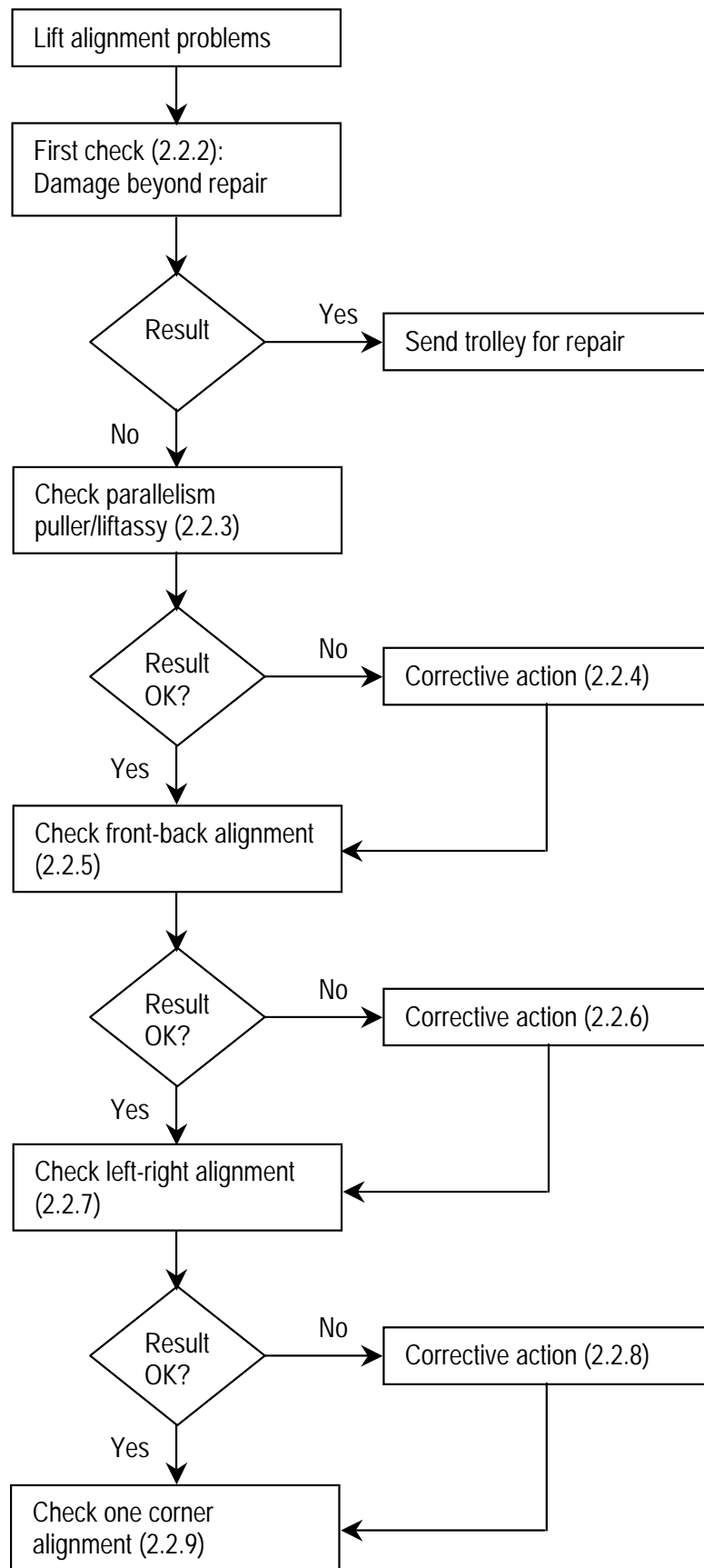


Figure 11

H5-00005.fm

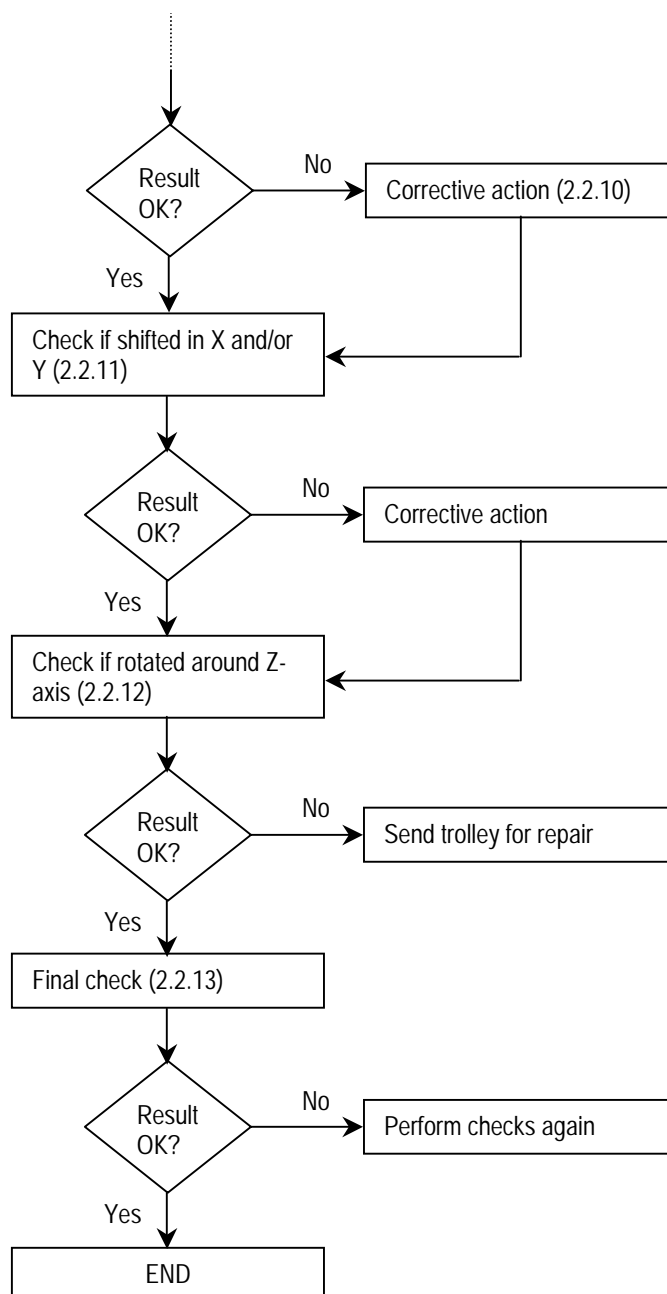


Figure 12

There are 5 different situations of misalignment of the lift (see Figure 4):

- 1.Front-back misalignment.
- 2.Left-right misalignment.
- 3.One-corner misalignment.
- 4.Shifted in x- or y-direction.
- 5.Rotated around the z-axis.

H5-00005.fm

## 1. First check

**Note:** To be sure that the lift-assembly, as it is hanging between the four tooth-belts, is not deformed or out of shape, a first check has to be done.

- Check if the 2 small strips on the front- and rear side of the lift-assy are not deformed (see Figure 5). If that is the case, the trolley has to be send back for repair.

## 2. Check parallelism between puller arm and lift assy

**Note:** The puller-tip movement area has to be parallel to the tray-carrier area. This is the plane between the two side guides:

- Remove the puller timing belt, see [H8.7 Vertical timing belt in tray trolley, replacement](#) in order to freely move the puller arm to the four corners.
- Use tool 4022 5320 737.0 "adjusting jig puller".
- Move the puller-arm manually to each of the four corners and measure the distance between upper side of guiding surface and topside of puller-arm (not the tip). This should be in all four corners  $1.2\text{mm} \pm 0.1\text{mm}$ .

## 3. Correction

- Adjustment is done by loosen the side guides and adjust as much as necessary (see Figure 7).

## 4. Replace the puller timing belt

- Therefore move the puller arm in the situation as on the photo on page 1. Check if the snap-in mechanism is in the hook-position, according to the manual page 7-67 table 7.15.
- NOTE "Lock" is same as "hook" position.  
"The distance "D" between spindle lever and housing should be approximately 22mm (see page 7-71 figure 7-37). When rotating the spindle counter clockwise, the lever is moving towards the snap-in motor. Within 180° rotation the encoder should find its index pulse (zero fine).  
"The puller-timing belt can now be replaced. Tension should be  $300 \pm 40$  Hz

"Check if the tip of the puller-arm is moving parallel to the carrier guide of the lift, according to manual page 7-68, table 7-16.

NOTE

H5-00005.fm

"If this is not the case, adjust the big pulley by slightly loosen the 2 bolts on top of the puller assembly (see page 7-72 figure 7-38) and rotate the wheel.

## **5. Front-back misalignment**

- When the lift is tilting the driving belt of the lift-motor is lifted over his teeth (see Figure 8). This can be caused by a component jammed between the belt and the pulley or when the tension on the belt is not enough.
- Check lift straightness compared to the trolley frame using two strips. First check straightness of the counterweights

## **6. Correction**

- Make sure that the belt and timing belt pulleys are marked (see Figure 10). Check which side (front- or rear-side) is shifted. Loosen the tension of the drive belt of the lift-motor by releasing the belt tension pulley (see Figure 9) and rotate the axle of the vertical lift-movement of the front or rear-side, without moving the drive belt. The teeth of the belt have to be shifted over the pulley.

## **7. Left-right misalignment**

- Check lift straightness compared to the trolley frame using two strips. Then raise lift to upper position and measure the four corners. These values have to be the same.
- Very small adjustment can be done by slightly loosen the three bolts of the small metal strip on front or rear-side wherewith the lift-plate is mounted between the vertical timing belts see Figure 11.
- When there is a large misalignment it is caused by the shifting of the vertical timing belts over their pulleys.

## **8. Correction**

- "Loosen the tension of the vertical timing belts by releasing the upper strip where the timing belt pulleys are mounted (see Figure 12). Loosen the two bolts.
- "Shift the timing belt one or two tooth over its timing belt pulley, to adjust the lift
- "Adjust the vertical lift belt tension according to figure 7.76 in the manual on page 7-125.

## **9. One Corner misalignment**

- Small misalignment can be adjusted by slightly loosen the three bolts of the small metal strip on front or rear-side wherewith the lift-plate is mounted between the vertical timing belts. See Figure 11.
- When there is a large misalignment it is caused by the shifting over the vertical timing belts over their pulleys.

## **10. Correction**

- According to the description on page 3, but now just adjust the timing belt pulley in one corner.

## **11. Shifted in X or Y direction**

- Check position in comparison with a slot in storage area. If not in line, check for deformation of the small strips in front- or rear-side

wherewith the liftplate is mounted between the vertical timing belts. See Figure 11 and Figure 13.

- There is a very small adjustment possible, but be very careful. With this adjustment the liftplate is not in the middle between the vertical lift belts.
- Small adjustment can be done by changing the length of the ball-joint screw (see Figure 13).

## 12. Rotated around the z-axis

- In this case the small metal strips must be deformed. It is better to replace the complete lift assembly.

## 13. Final check

- The lift assembly should be horizontal again and the contra-weights must be on equal heights.
- This can be checked by using the two suspension beams 4022 532 0549.0. Measure the distance from topside of the beam to the topside of the guiding rail. Compare this value on the four corners of the liftplate plate assy.

## 14. Finalize

- "Measure and adjust EPD puller tip in stock area and the zero coarse puller according to the description in the service manual, volume 1 page 7-78, table 7-18 and page 7-85, table 7-19.
- "Calibrate according to the description in the service manual in page 7-129.
- NOTE
- "Install jumper X44 to overwrite calibration data.

## H5.3 Reference information

### H5.3.1 Tray trolley controller, LED status check

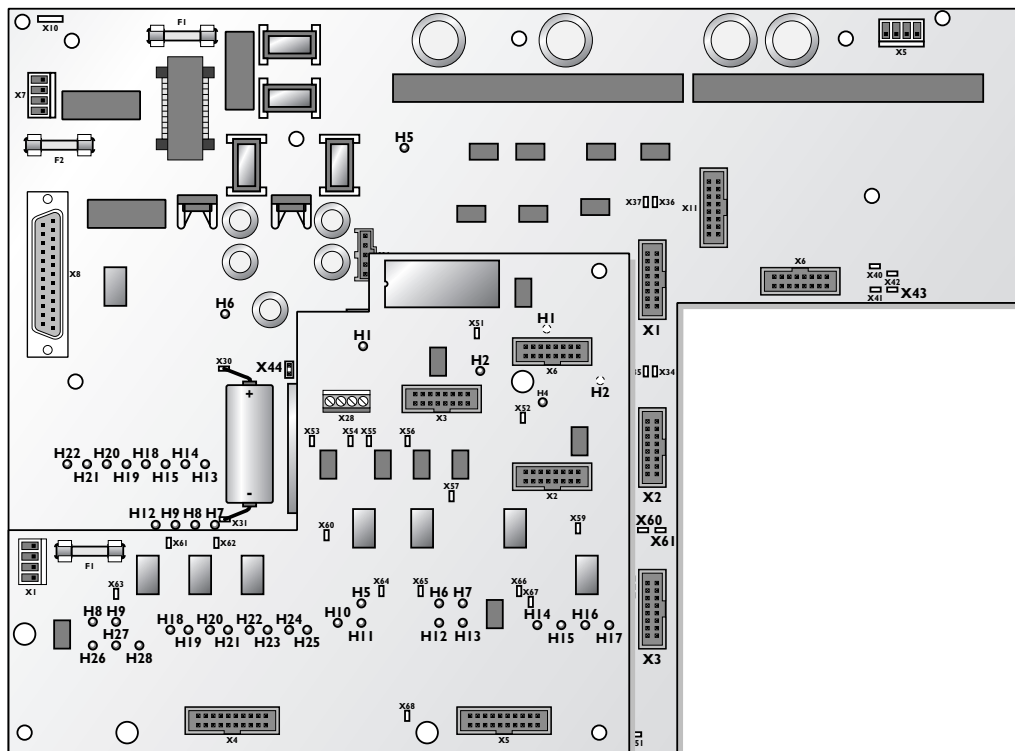


Figure 13 Tray trolley controller, LED status check

LED	ON/OFF	SYSTEM STATUS
H5	ON	24V supply < 16V (power failure)
H6	ON	Servo Power 45V ok.
H22	ON	Amplifier Index Puller
Operational state of the tray trolley		
H7	ON	Door closed
H8	ON	Lift in load/unload position
H9	ON	Zero course puller
H11	ON	Storage error rear
H13	ON	Zero course snap-in
H17	ON	Brake lift
H26	ON	Carrier at store position left (Hook pos.)
H27	ON	Carrier at store position right (Eject pos.)
H28	ON	Puller in stock area

Figure 14 Tray trolley controller, LED status check

H5-00003.fm

H5.3.2 Tray trolley controller, connections

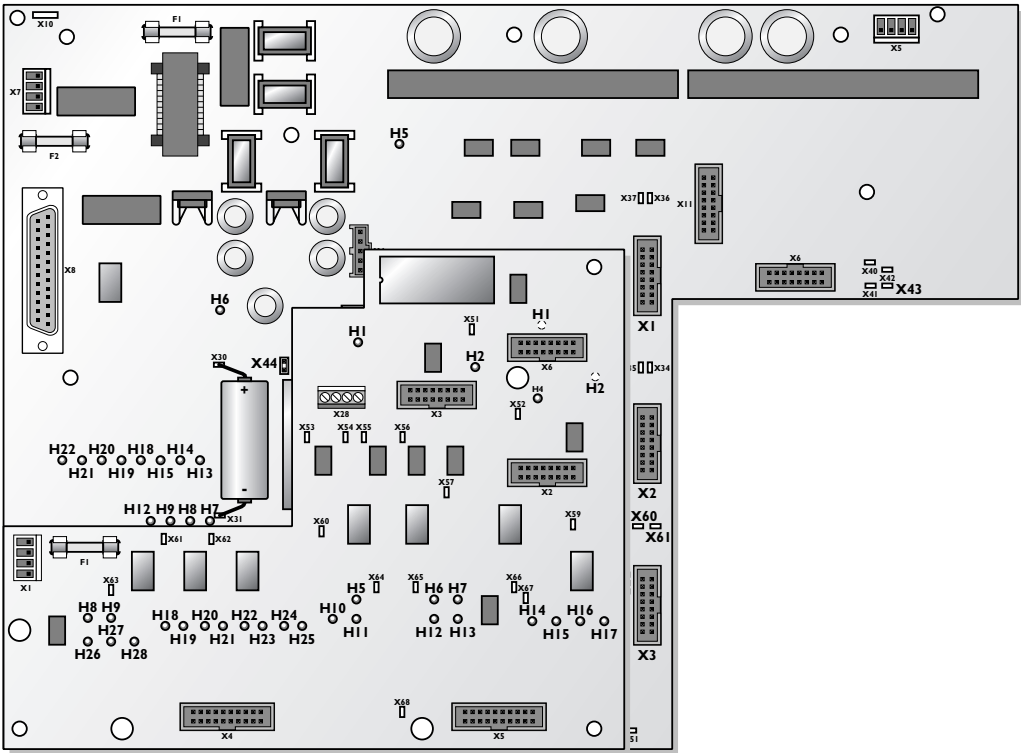


Figure 15 Tray trolley controller, connections

Connections	Item	Function
F1	Fuse 45V/4A	Servo power
F2	Fuse 24V/2A	Board power supply
X1	Connector	Servo puller
X2	Connector	Servo snap-in
X5	Connector	Motor lift
X7	Connector	Power input
X8	Connector	Bitbus communication
X100	Connector	Control panel
Connections upper board (Piggyback)		
X1	Connector	Power Input
X2	Connector	Encoder lift
X4	Connector	I/O puller
X5	Connector	I/O lift

Figure 16 Tray trolley controller, connections

H5-00003.fm

### H5.3.3 Tray trolley, sensors and switches, overview

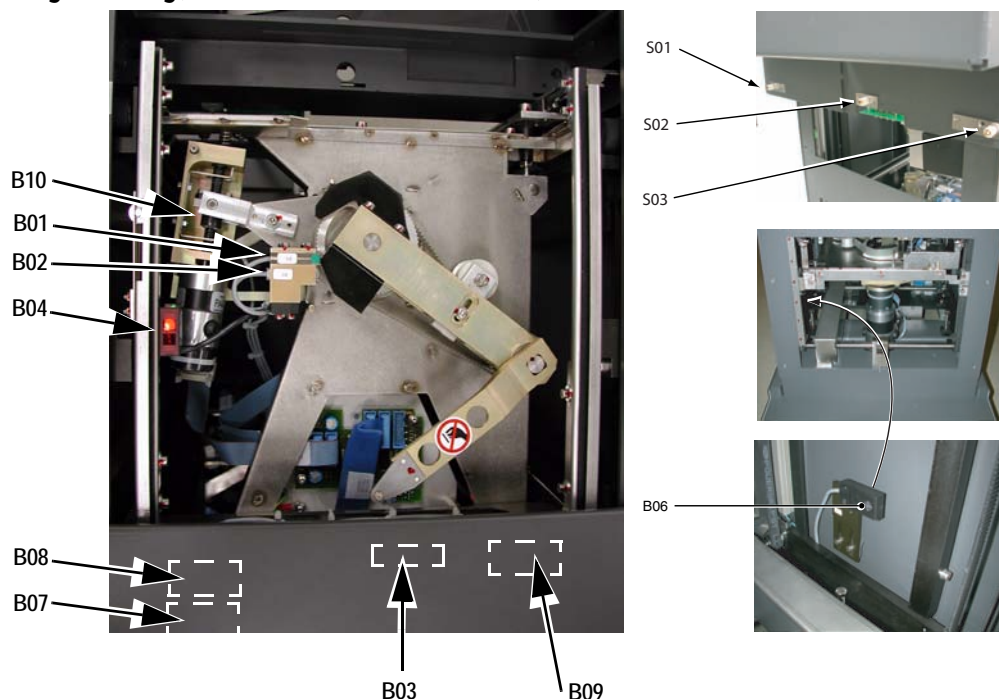


Figure 17 Tray trolley, sensors and switches, location

Sensor	Type	Description
S01, S02, S03	Sliding contacts	Trolley in lift position
B01	Epd-sensor	Puller in stock area. The sensor is activated when the puller arm is in the stock area. A vane activates the sensor. When the puller arm is in stock area, the vane is above the sensor.
B02	Epd-sensor	Zero-coarse puller. This sensor is activated when the puller arm is in the pick area. The sensor activates when the vane is above the sensor.
B03	Light-sensor	Carrier safe on lift. When the sensor is not activate and the B04 is activated, it means that a carrier is not in a safe position on the lift at the side of the pick position.
B04	Light-sensor	Carrier in lift. The sensor is activated when a carrier is present in the lift.
B05	Laser	Storage sensor front. When the laser beam is interrupted it means that a carrier is not in a correct position in the storage area. This will not allow the puller to place a carrier in the storage area.
B06	Epd-sensor	Zero-coarse lift. The sensor makes sure that, during start-up, the lift is in a safe position to home the puller-arm. The sensor is activated by the counter weight.
B07	Laser	Storage sensor rear. When the laser beam is interrupted it means that a carrier is not in a correct position in the storage area. This will not allow the lift to move up or down.
B08	Light-sensor	Tray in eject position. This sensor is activated when a carrier is in the eject position.
B09	Light-sensor	Tray in hook position. This sensor is activated when a carrier is in the hook position. When both sensors B08 & B09 don't detect a carrier, the stock position is considered empty, otherwise not empty.
B10	Epd-sensor	Zero-coarse snap-in. The sensor indicates the zero-coarse during the homing procedure.

H5-00003.fm

Figure 18 Tray trolley, sensors and switches, overview



## H5.4 Diagrams

### H5.4.1 Tray trolley, diagram

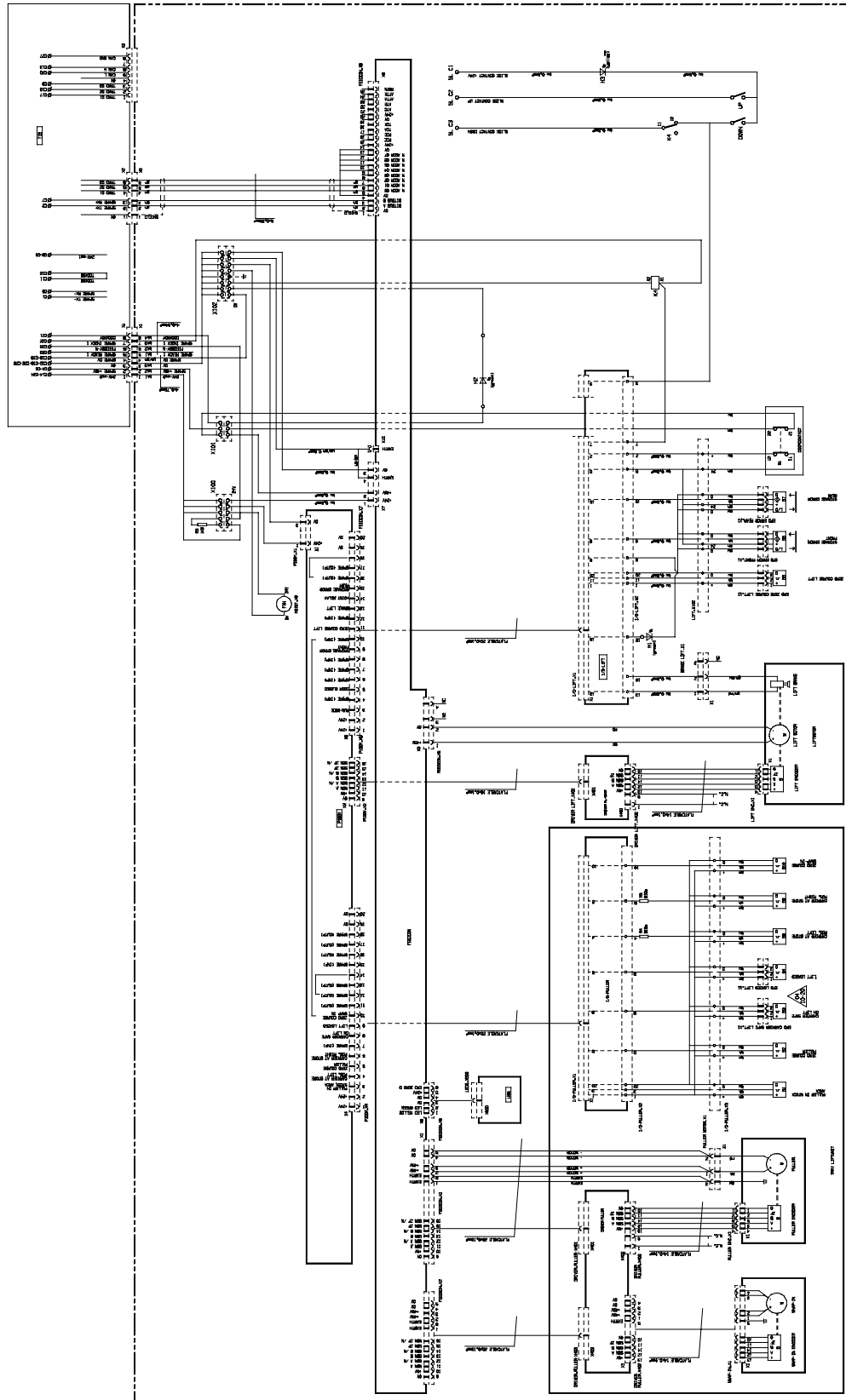


Figure 19 Tray trolley, diagram

H5-00004.fm



## CHAPTER H6 Measurement, adjustment and calibration

Only a regional service engineer is allowed to remove a sealed bolt. After replacing the bolt, it needs to be sealed again. Therefore Loctite 7400 coating is required. In general, when a sealed bolt has been replaced it needs re-adjustment.

H6-00001.fm

## H6.1 Tray trolley, height adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .



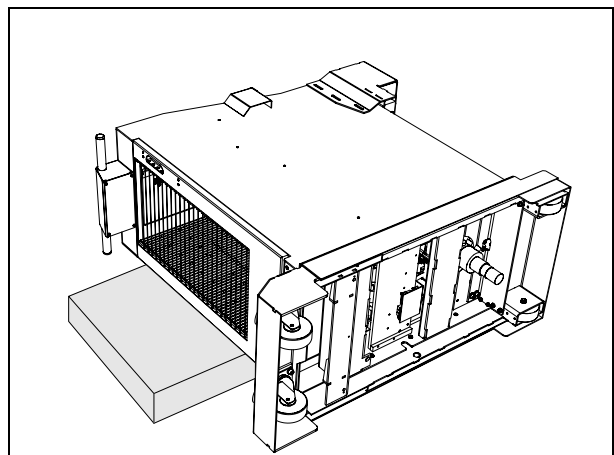
**NOTE:** This procedure applies when changing the board transport height from SMEMA range to JIS range, or vice versa.

### **CAUTION**

HEAVY OBJECT ( $\pm 200$  kg)  
Improper lifting method may cause injury.  
Use 3 persons to lift the object.

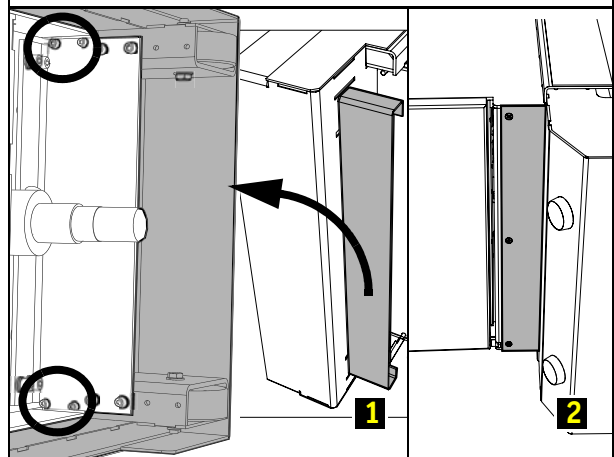
### 1. Prerequisites

- Place the tray trolley on its side on a pallet cart or on two wooden bars (prepare the surface so the that the trolley doesn't get scratched).



### 2. Remove cover strips when changing from SMEMA to JIS

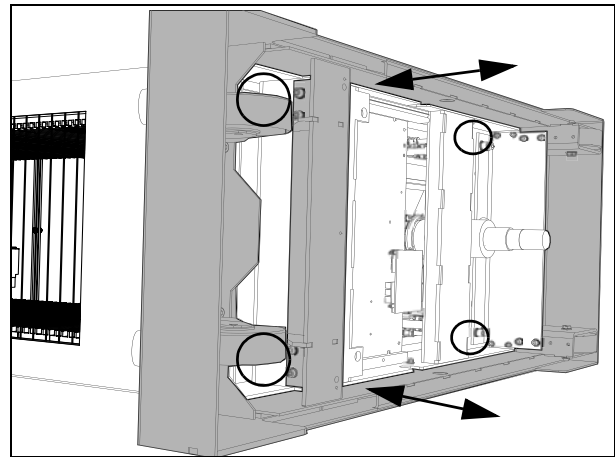
- Remove cover strip rear (1) (4x M6 bolt from inside).
- Remove cover strip front (2).



H6-00002.fm

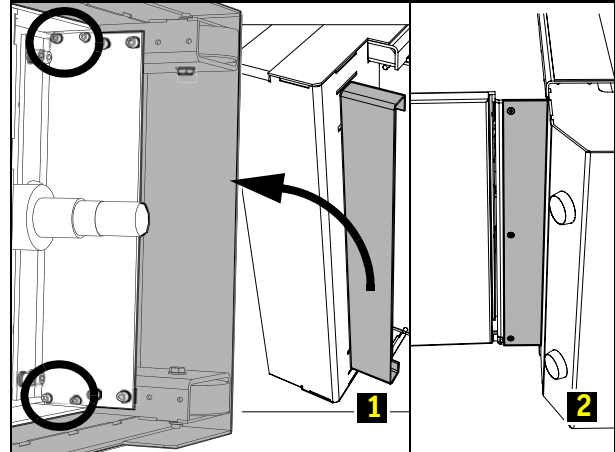
### 3. Adjust the trolley height

- Loosen frame fixing bolts front (4x) and rear (4x) and remove them.
- Slide wheel frame to required position.
- Replace the 8 bolts and tighten them.



### 4. Install cover strips when changing from JIS to SMEMA

- Install cover strip rear (1) (4x M6 bolt from inside).
- Install cover strip front (2).



### 5. Finalize

- Place the trolley upright again.

**Note:** After changing trolley to JIS height:  
Store both cover strips so they can be used again when trolley needs to be set to Smema height.

## H6.2 Tray trolley, connecting with extension cable

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

**WARNING:** Before removing or adjusting system components, operate correct shut-down procedures and switch off the feeder power supply

**CAUTION:** To avoid component damage by ESD, connect body mass to an ESD point before starting maintenance on the placement system or the tray trolley

### 1. Prerequisites

- Remove the tray trolley and power down the machine.

### 2. Connecting the extension cable

- Remove the metal cable protection plate, by loosening the two bolts
- Disconnect the two connectors.
- Note their position before disconnecting to prevent wrong reconnection later.
- Connect the two connectors of the extension cable to the tray trolley.
- Remount the metal cable protection plate, to prevent cable damage during calibration.

### 3. Connect second part of extension cable

- Disconnect the grey connector behind the tray trolley lift
- Connect the second part of the extension cable to the grey connector on the base.
- Connect the two parts of the extension cable (plug in the two red connectors)



H6-00007.fm

## H6.3 EPD B01 puller in stock area, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

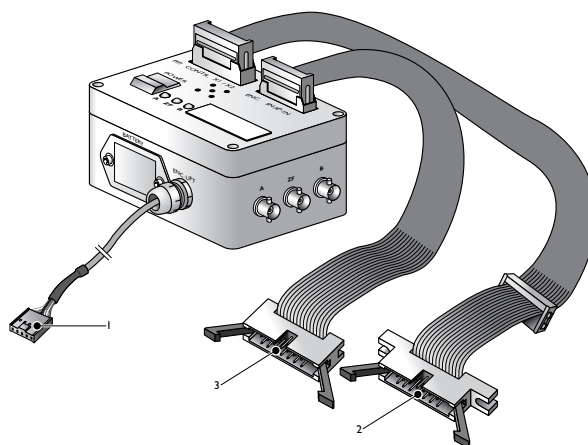
Required part(s) . . . . .

### 1. Prerequisites

- Power down the machine.
- Connect the tray trolley to the machine with the extension cable, see [H6.2 Tray trolley, connecting with extension cable](#)  
The trolley must be in the lower position.  
Use wooden beams to support the trolley.

### 2. Connecting the encoder tester to puller motor encoder

- Remove puller motor encoder cable and connect encoder tester (1).
- Make sure that the cam of the connector is facing the motor.
- Power up the machine.
- Switch on the placement system.



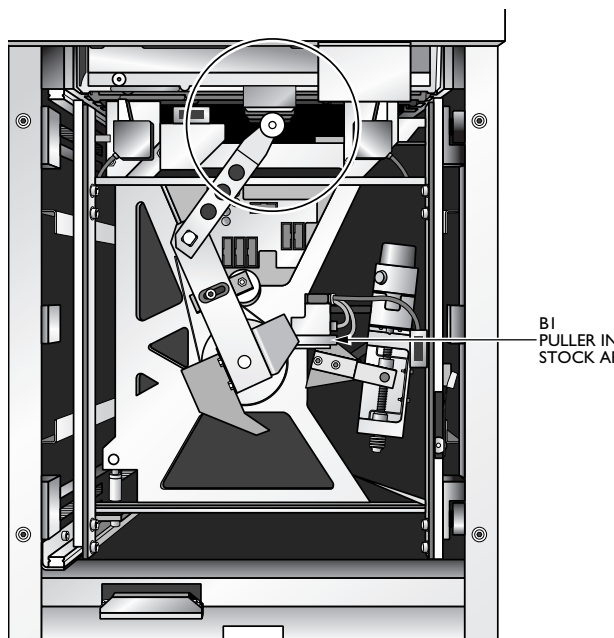
### 3. Release the lift motor brake

- Use an external power supply to the motor brake.
- Disconnect the lift motor brake connector X1 and apply 24 V between pin 1 (+ve) and pin 2 (-ve) on the motor side, to release the brake of the lift motor and re-connect X1 after adjustment (polarity sensitive).

### 4. Adjust

**Note:** The new extension cable has a 24V connection.

- Install the 20 mm adjustment ring at the puller catch pin.
- Put a carrier in position 23 and place the lift in front of position 23.
- The carrier must be in the 'hook' position.
- The 'lock' position can be found by rotating the spindle clockwise (2 in 21) until the first index puls after activating the zero coarse EPD (LED H13). The index puls can be read from the encoder tester.
- Push the puller arm with the ring carefully against the carrier which is in 'hooked' position (position 23).
- Check that the EPD 'puller in stock area (B1)' is just active (distance between EPD and metal vane is 0.5mm +/- 0.2mm). LED H28 at the tray trolley controller piggy board lights up when active.
- If necessary, adjust by moving the sensor B1. When it is just active, tighten the sensor bolts.



## 5. Finalize

- Calibrate the tray trolley, see [H6.20 Tray trolley, calibrating](#) .



## H6.4 EPD B02, puller safe / puller zero coarse adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

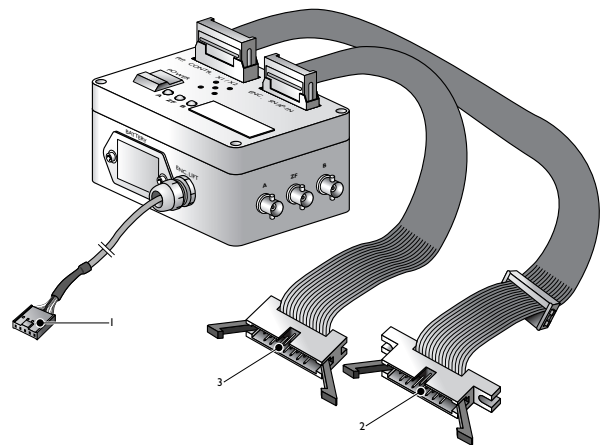
**WARNING:** Make sure the puller arm tip is in the middle of the lift (in a safe position!) when moving the lift up or down!

### 1. Prerequisites

- Power down the machine.
- Connect the tray trolley to the machine with the extension cable, see [H6.2 Tray trolley, connecting with extension cable](#)
- Trolley must be in the lower position.  
Use wooden beams to support the trolley.

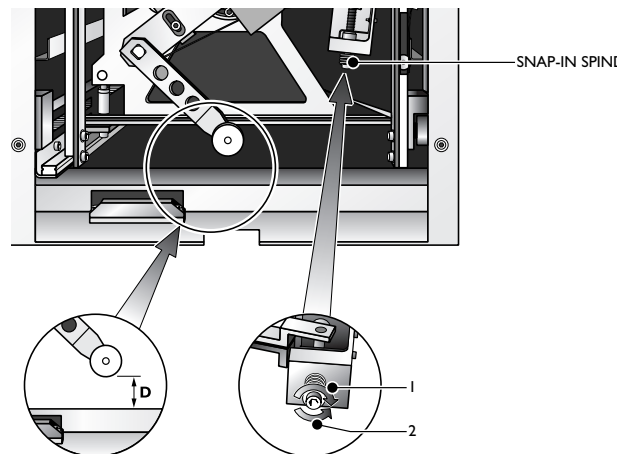
### 2. Connecting the encoder tester to puller motor encoder

- Remove puller motor encoder cable and connect encoder tester (1).
- Make sure that the cam of the connector is facing the motor.
- Power up the machine.



### 3. Check

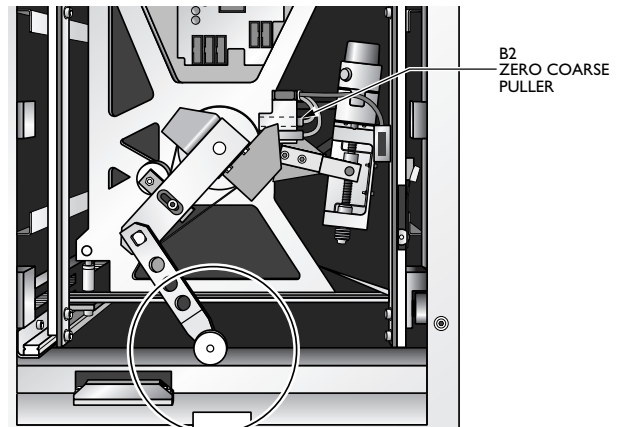
- Push the lift to carrier position 13, turn snap-in to the 'lock' position (2 in 23) by rotating the spindle clockwise until the first index pulse after activating the zero coarse EPD (LED H13). The index pulse can be read from the encoder tester.
- Push the puller arm tip carefully against the rear cover of the frame (without the adjustment ring!).
- Move the puller arm inwards until the EPD (B2 in 24) is just active/out (switch moment) (LED H9) (distance between plate and EPD =  $0.5 \pm 0.2\text{mm}$ ). The distance between the puller arm tip and the rear cover must be  $10 \pm 1\text{mm}$ . Install the 20mm adjustment ring (see chapter 12.29) to check this distance.
- If the distance is NOT 10mm, it must be adjusted.



H6-00019.fm

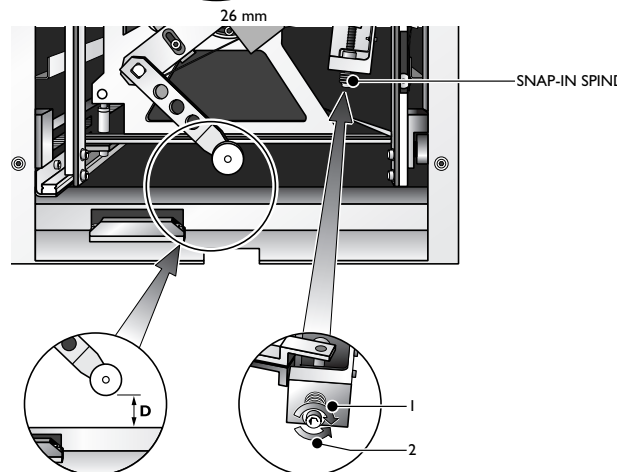
#### 4. Adjust 1

- Install the 20mm adjustment ring.
- Push the puller arm tip carefully against the rear cover of the frame.
- Move the zero coarse puller EPD (B2 ) inwards until the EPD is just active (LED H9).
- Check the distance again by following the steps above.



#### 5. Adjust 2

- Switch off the power.
- Connect the encoder tester to the puller motor encoder with the cam (see FIGURE 8A-52) facing the motor. Reconnect snap-in encoder cable.
- Switch the power on again.
- Move the puller arm inward to check if the zero fine signal is present. Distance 'D' must be between 12 - 36mm.
- Switch off the power.
- Disconnect the encoder tester and reconnect the encoder cable.



#### 6. Finalize

- Calibrate the tray trolley, see [H6.20 Tray trolley, calibrating](#)

## H6.5 Tray carrier sensor B03, B04 adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

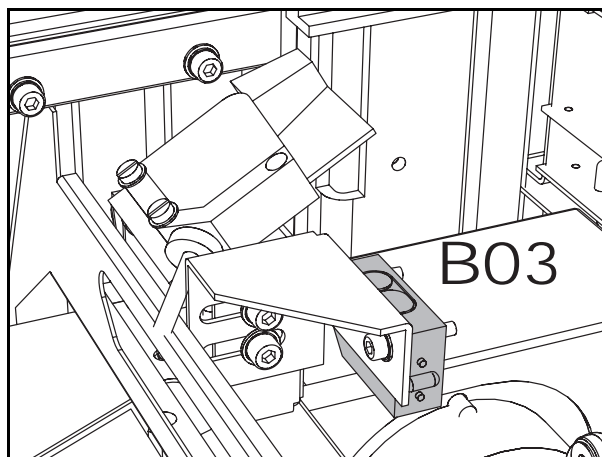
Required part(s) . . . . .

### 1. Prerequisites

- 
- 

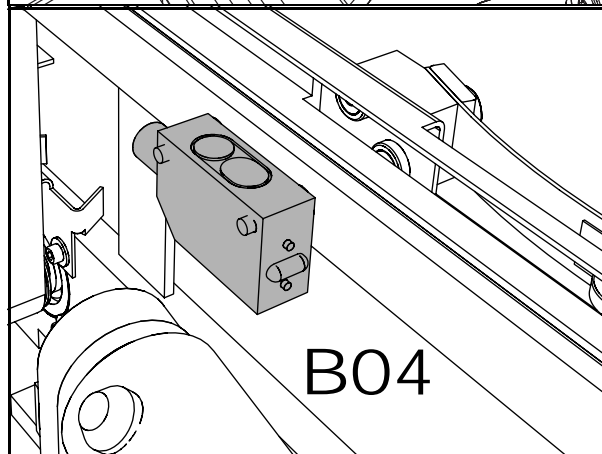
### 2. Distance threshold adjustment sensor B03, B04

- Place a tray carrier **on top of** the guides.
- Turn the adjustment screw until the orange LED turns off.
- Check if a tray placed **in** the guides will be recognized.
- Secure the adjustment screws with sealing wax.



### 3. Sensor position, sensor B03 only

- Put a tray carrier in the lift unit with the puller in the lift position.
- The sensor must recognize the tray carrier.
- Position the sensor in such a way that, when sliding the tray carrier 2 mm in the pick direction, the sensor turns off.
- Check the adjustment with the TIP tools.



## H6.6 Laser B05, sensor storage in tray trolley, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .



### LASER BEAM

Looking into it may injure your eyes.

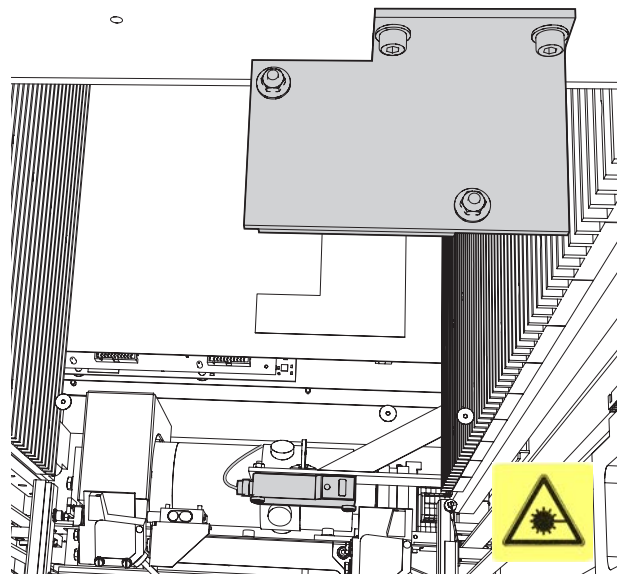
Do not stare into it

### 1. Prerequisites

- 
- 

### 2. Adjusting laser B05

- Move the adjustment carrier from slot 45 to slot 40.
- If the rear laser beam does not cause the yellow LED to illuminate, adjust the laser with the two screws in the middle of the tray trolley.
- Adjust the reflector until the largest reflected laser beam is centered around the hole of the adjustment carrier.
- Remove the adjustment carrier from slot 1 and replace it with a regular carrier.
- Move the regular carrier 2 mm outside the door.
- Adjust the laser intensity until the LED illuminates.



H6-00021.fm

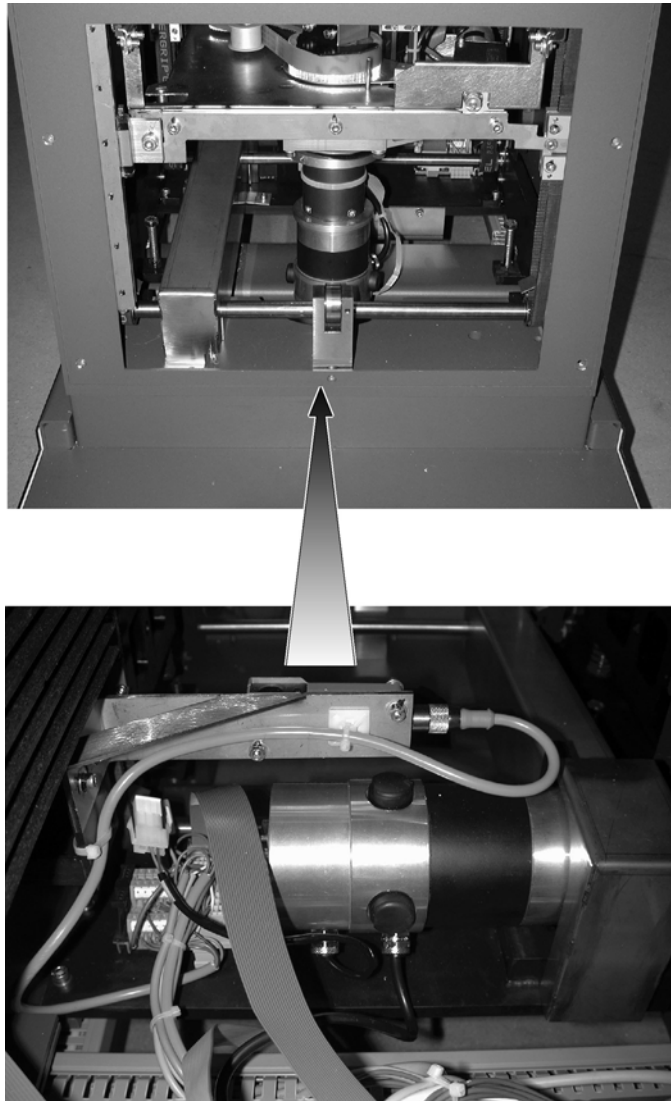


Figure 20 Laser sensor storage adjustment - Rear

H6-00021.fm

## H6.7 EPD B06 in tray trolley, adjustment

Estimated time to complete [min.]: ?

Required special tools. . . . . ?

Required part(s) . . . . . ?



**NOTE:** The sensor can be mounted in two ways on the tray trolley depending on the status of the trolley. It can either be pointing with the LED up or with the LED pointing towards the storage area. Adjustment of the sensor stays the same.

### 1. Prerequisites

- Connect the trolley to the machine, see [H6.2 Tray trolley, connecting with extension cable](#)

### 2. Check function of EPD (B06)

- In the highest position (with the counterweights against the end stops) the sensor must be activated.

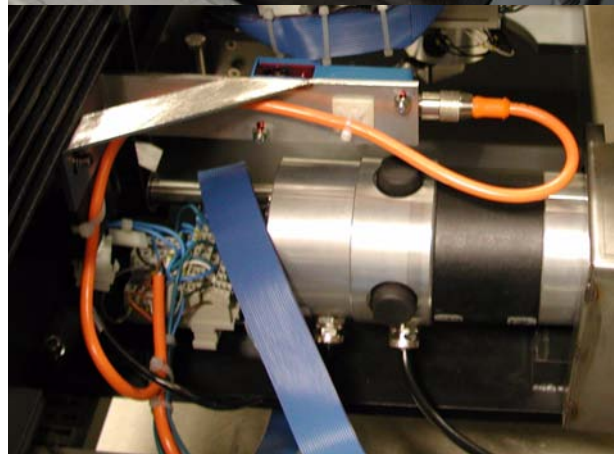
**Note:** To check this there is a small LED (1?) on the sensor.



### 3. Release lift motor brake

- Release the lift motor brake with an external power supply to the motor brake.
- Disconnect the lift motor brake connector X1 and apply external power supply of 24 V between pin 1 (+ve) and pin 2 (-ve) on the motor side, to release the brake of the lift motor and re-connect X1 after adjustment (polarity sensitive).

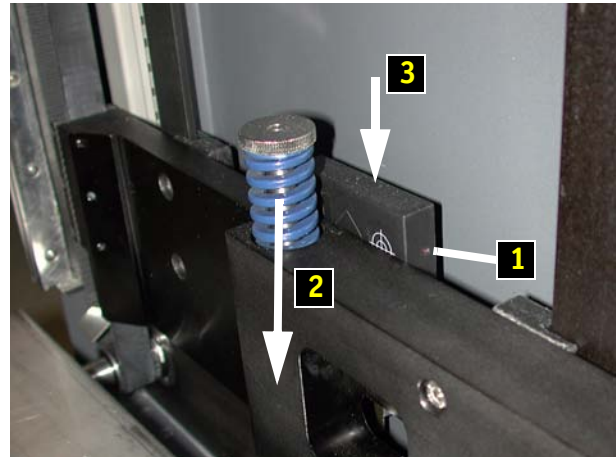
**Note:** The standard extension cable has a 24V connection.



H6-00003.fm

## 4. Adjust EPD (B06)

- Loosen the bracket bolts of the lift zero coarse EPD.
- Move the lift counter weight completely down against its end stop (2). (The lift is now up.)
- Check when the sensor (1) is just activated.
- Move bracket with sensor until sensor is just activated (3).
- Hand-tighten one screw.
- Mark this position on the side of the trolley frame with a marker pen.
- Move the sensor 2mm below the mark and tighten the bracket with sensor.





## H6.8 Tray trolley lift, checking the offset between the lift EPD (B06) and the lift motor encoder zero fine

Estimated time to complete [min.]:

Required special tools. . . . .

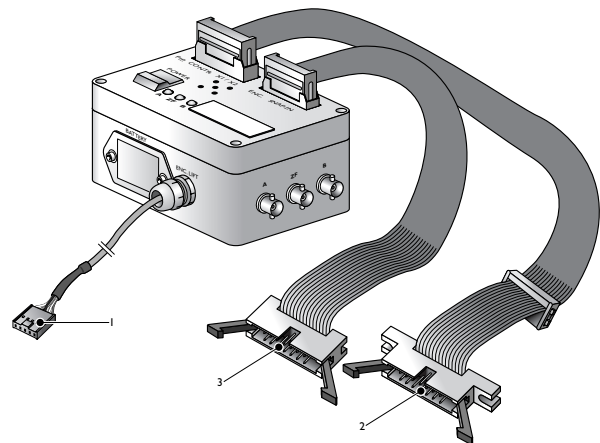
Required part(s) . . . . . Encoder tester

### 1. Prerequisites

- Connect the tray trolley to the machine with the extension cable [H6.2 Tray trolley, connecting with extension cable](#)
- Power up the machine.
- The trolley must be in the lower position (use wooden beams to support the trolley).
- Move the lift manually to its highest position.
- Power down the machine.
- Slide the tray trolley controller cabinet out of the trolley, see [2. Remove tray trolley controller cabinet](#)

### 2. Connecting the encoder tester to lift motor encoder

- Remove lift encoder cable and connect encoder tester (1).
- Power up the machine.



### 3. Release lift motor brake

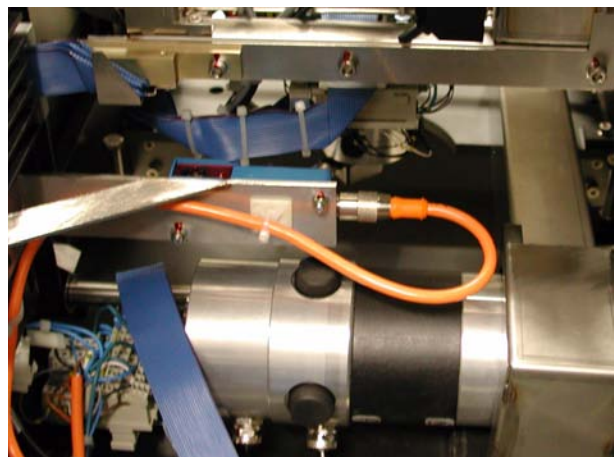
- Release the lift motor brake with an external power supply to the motor brake.
- Disconnect the lift motor brake connector X1 and apply external power supply of 24 V between pin 1 (+ve) and pin 2 (-ve) on the motor side, to release the brake of the lift motor and re-connect X1 after adjustment (polarity sensitive).

**Note:** The new extension cable has a 24V connection.

### 4. Encoder check

**Note:** The zero fine signal may only be present once in the active range of the EPD. It must also be at least a quarter of a lift motor rotation away from the EPD-activation point.

- Move the lift downwards manually and check that the zero fine signal is present only once.
- If the signal is present more than once, re-adjustment is necessary:



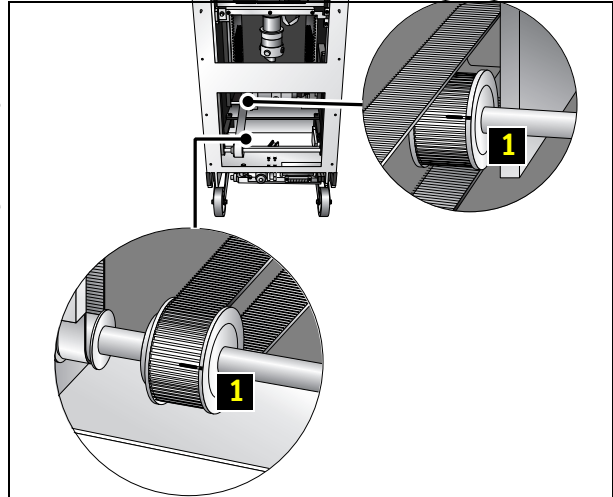
H6-00004.fm



## 5. Marking the drive belt

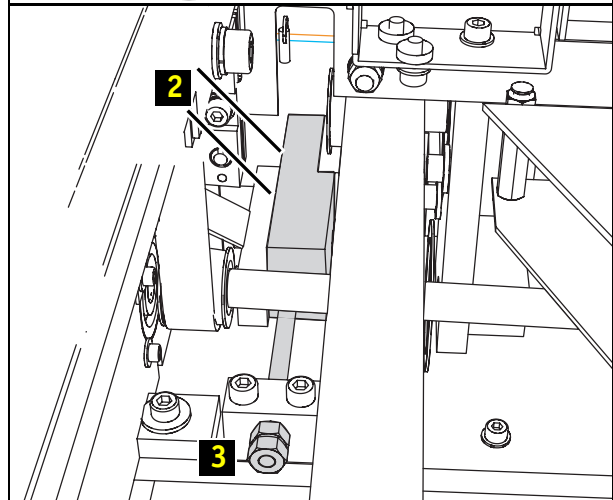
- Remove the belt cover.
- Move the lift in such a position that the markers (1) on the belts and timing belt pulleys are clearly visible.

**Note:** When no marks are available then mark both the belt and the timing belt pulley of both axes (front and rear) with an indelible marker pen.



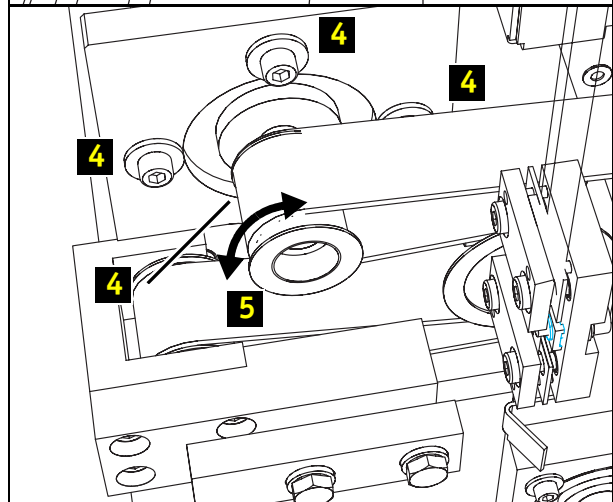
## 6. Slacken the drive belt

- Loosen the two lock bolts (2).
- Loosen the lock nut (3) of the belt tension adjuster.
- Turn the belt tension adjuster (3) clockwise (outwards) until the belt tension block is completely slack.
- Mark the belt and timing belt pulley of the lift motor.



## 7. Adjust lift motor position

- Loosen the 4 motor fastening bolts (4) as far as possible so that the belt can be slipped off the motor and the motor shaft can be rotated.
- Rotate the motor shaft (5) as much as needed.
- Hand-tighten the motor fastening bolts and tighten the belt.
- check encoder, see step [4..Encoder check](#)
- Repeat the above procedure until the signal is present only once.



## 8. Finalize

- Tighten the bolts of the motor.
- Power down the machine.
- Remove the encoder tester and re-connect the encoder cable.
- Adjust the belt tension, see [H6.18 Drive belt of tray trolley lift, adjustment](#)
- Put the controller cabinet back in place.
- Put back the cover plate at the back of the tray trolley.
- Calibrate the tray trolley, see [H6.20 Tray trolley, calibrating](#).

H6-00004.fm

## H6.9 Laser B07, sensor storage in tray trolley, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

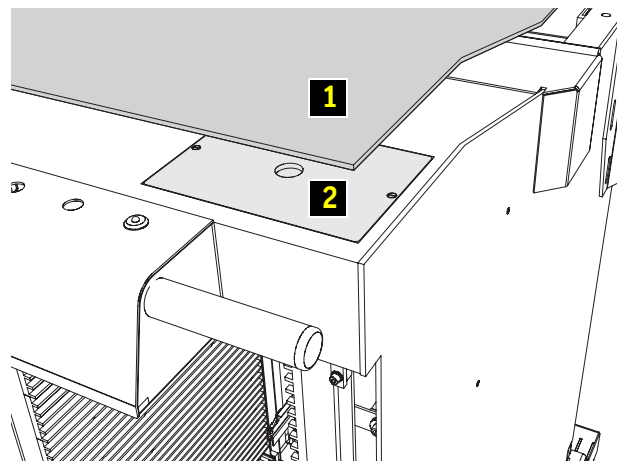


### LASER BEAM

Looking into it may injure your eyes.  
Do not stare into it

### 1. Prerequisites

- Remove covers (1,2).

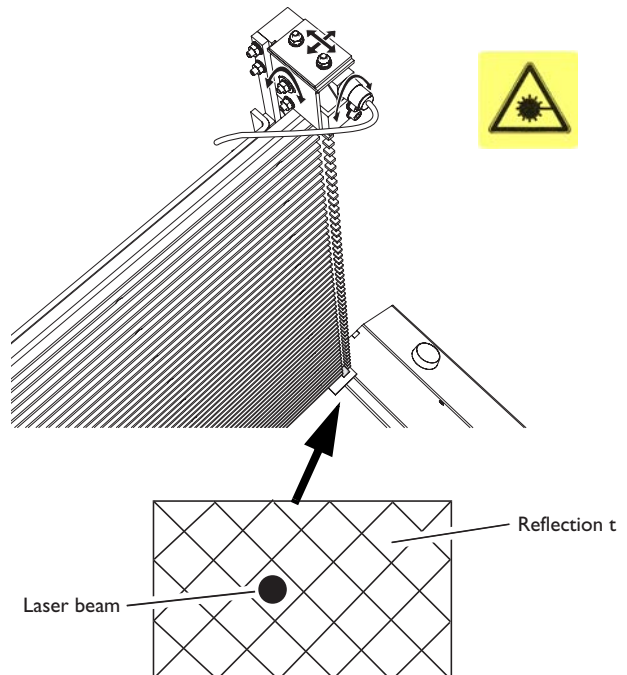


### 2. Adjustment of laser sensor front

**Do not look into the laser beam.**

**The laser is a class II laser which can cause serious injury!**

- Set the laser sensor to maximum intensity.
- Adjust the focus of the laser beam. The spot must be as small as possible at a distance of 590 mm (point to a wall).
- Install 2 adjustment carriers; one at slot 10, the other at slot 47. (Both in hook position).
- Adjust the laser beam until the beam passes both holes of the adjustment carriers. (Spot may be symmetrical around the hole).
- Tighten the bolts and verify if the beam still passes both holes. If not, re-adjust.
- Remove the carriers
- Align the reflector foil until the laser beam reflects within a square of the foil.



### 3. finalize

- Installation in reverse order.

H6-00011.fm

## H6.10 Light sensor B08, B09, carrier detection adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

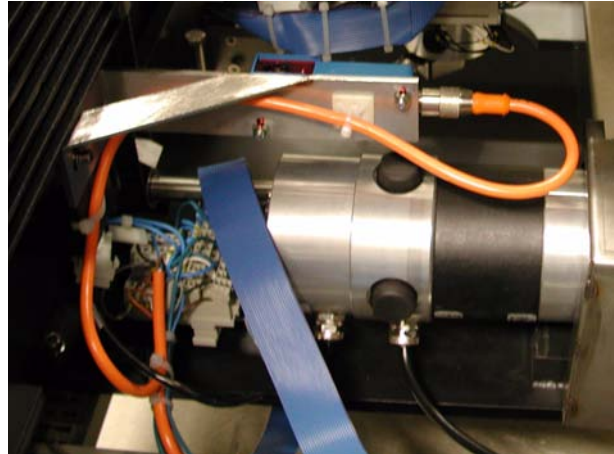
### 1. Prerequisites

•

### 2. Release lift motor brake

- Release the lift motor brake with an external power supply to the motor brake.
- Disconnect the lift motor brake connector X1 and apply external power supply of 24 V between pin 1 (+ve) and pin 2 (-ve) on the motor side, to release the brake of the lift motor and re-connect X1 after adjustment (polarity sensitive).

**Note:** The standard extension cable has a 24V connection.



Action	Description	Figure
Move the lift to the third carrier slot.	MAKE SURE THE PULLER ARM TIP IS IN THE MIDDLE OF THE LIFT (IN A SAFE POSITION!) WHEN MOVING THE LIFT UP OR DOWN!	
Install an aluminium adjustment carrier in the third carrier slot in 'hooked' position (see Figure 25). Move the adjustment carrier 5 cm into the lift of the tray trolley (see Figure 23). Push the calibration plate (1) down in the magazine guides and hold it there. Pull the lift (2) up until the lift carrier guides touch the bottom of the calibration plate. Now ask someone to enable the brake (by disconnecting the external 24V power supply) while you hold the lift carrier guides against the calibration plate.		see 23, 25 and 22
Remove the aluminium adjustment carrier and insert a normal carrier in 'hooked' position. The position of the underside of the carrier detection adjustment tool itself is 1,5mm under the underside of the carrier.		

H6-00008.fm

Action	Description	Figure
Check the height of sensor B9 (Figure 24) with carrier detection adjustment tool. To do so, move the tool forward and backward to feel if the sensors touch the underside of the tool. This should <b>NOT</b> be the case! If the sensors touch the underside of the tool, adjust them so that the top of the sensor housing is 1,5 mm + 0,5mm under the underside of the carrier. Also, the sensors should be max. 0,5mm below the underside of the tool.		see 24 and 25
Check if the light spot is visible just below the middle of the 'hooked' carrier. If it is not, it must be adjusted.	Adjustment is done as follows: Loosen the two bolts of sensor (B9 in 24). Position and tighten the carrier detection adjustment tool in the lift carrier guides on top of the sensor housing. Hold the top of the sensor housing against the carrier detection adjustment tool and adjust the sensor so that the light spot is visible in the middle half of the 'hooked' carrier (see Figure 25). Tighten the sensor bolts.	see 24 and 25
Move the carrier 10mm out of the tray trolley (10 mm towards outside door).		
Check the height of the sensor, the complete light spot must be visible on the white surface of the carrier front (above the middle).		see 25
Adjust the light spot (when the carrier is in the 'hooked' position move it 10mm towards the door) with the light intensity adjustment screw (1 in 25) until the LED at the sensor goes just out.	Check by moving the tray carrier outward. The LED must go out at 10mm.	
Power down the machine.		
Connect the brake connector.		
Connect the controller cabinet and place the controller back in trolley.		

Figure 21 Carrier in 'hooked' position

22 describes how to adjust the carrier-in-eject position.

Action	Description	Figure
Release the lift motor brake with an external power supply to the motor brake.	Disconnect the lift motor brake connector X1 and apply external power supply of 24 V between pin 1 (+ve) and pin 2 (-ve) on the motor side, to release the brake of the lift motor and re-connect X1 after adjustment (polarity sensitive).  <b>NOTE:</b> The new extension cable has a 24V connection.	
Move the lift to the third carrier slot.	MAKE SURE THE PULLER ARM TIP IS IN THE MIDDLE OF THE LIFT (IN A SAFE POSITION!) WHEN MOVING THE LIFT UP OR DOWN!	
Install an aluminium adjustment carrier in the third carrier slot in 'hooked' position (see Figure 25). Move the adjustment carrier 5 cm into the lift of the tray trolley (see Figure 23). Push the calibration plate (1) down in the magazine guides and hold it there. Pull the lift (2) up until the lift carrier guides touch the bottom of the calibration plate. Now ask someone to enable the brake (by disconnecting the external 24V power supply) while you hold the lift carrier guides against the calibration plate.		see 23 and Figure 25
Remove the aluminium adjustment carrier and insert a normal carrier in 'eject' position. The position of the underside of the carrier detection adjustment tool itself is 1,5mm under the underside of the carrier.		
Check the height of sensor B8 (see Figure 24) with carrier detection adjustment tool. To do so, move the tool forward and backward to feel if the sensors touch the underside of the tool. This should <b>NOT</b> be the case! If the sensors touch the underside of the tool, adjust them so that the top of the sensor housing is 1,5mm + 0,5mm under the underside of the carrier. Also, the sensors should be max. 0,5mm below the underside of the tool.		see 24 and 25

H6-00008.fm

Action	Description	Figure
Check if the light spot is visible just below the middle of the 'ejected' carrier. If it is not, it must be adjusted.	Adjustment is done as follows: Loosen the two bolts of sensor (B8 in 24). Position and tighten the carrier detection adjustment tool in the lift carrier guides on top of the sensor housing. Hold the top of the sensor housing against the carrier detection adjustment tool and adjust the sensor so that the light spot is visible in the middle of the 'ejected' carrier (see Figure 25). Tighten the sensor bolts.	see 24 and 25
Move the carrier 10mm out of the tray trolley (10 mm towards the outside door).		
Check the height of the sensor, the complete light spot must be visible on the white surface of the carrier front (above the middle).		see 25
Adjust the light spot (when the carrier is in the 'eject' position 10mm towards the outside door) with the light intensity adjustment screw (1 in 25) until the LED at the sensor goes just out.	Check by moving the tray carrier outward. The LED must go out at 10mm.	
Power down the machine.		
Connect the brake connector.		
Connect the controller cabinet and place the controller back in the trolley.		

Figure 22 Carrier in 'eject' position

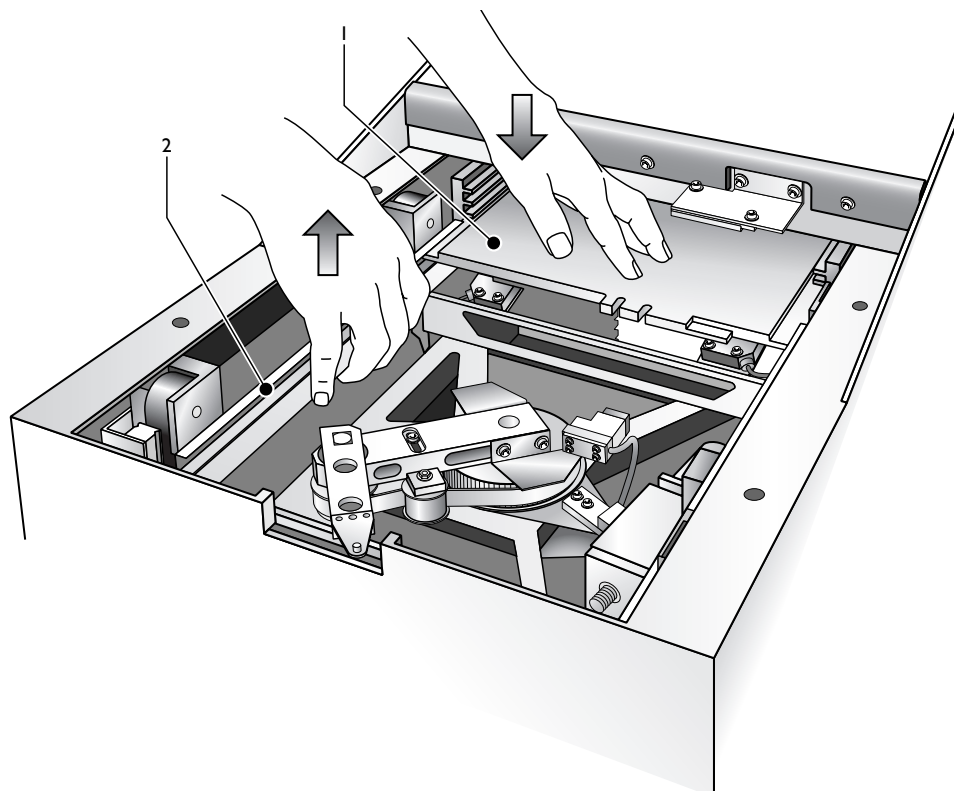


Figure 23 Handling the adjustment carrier (ACM tray trolley shown)

H6-00008.fm

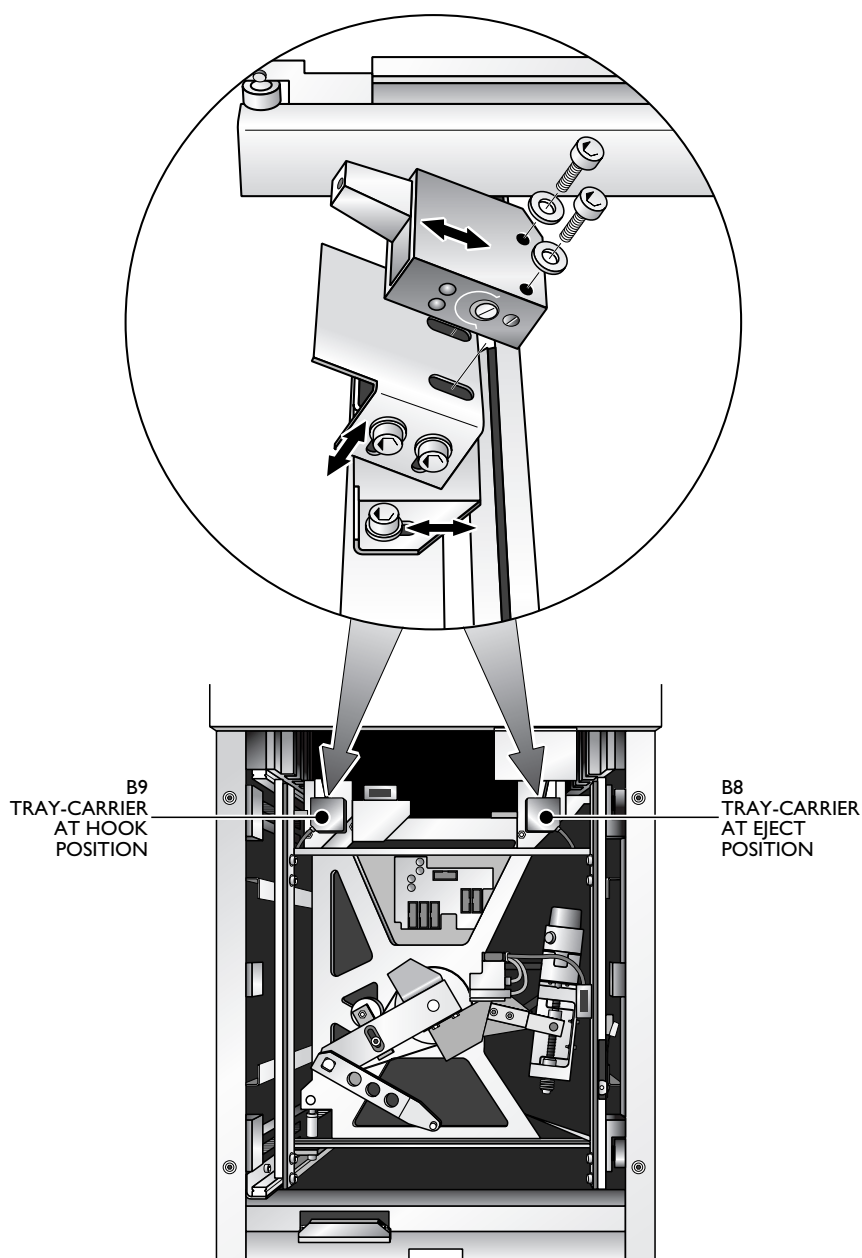


Figure 24 Carrier in 'hooked' / 'eject' position (ACM tray trolley shown)

SD-161e.eps

H6-00008.fm



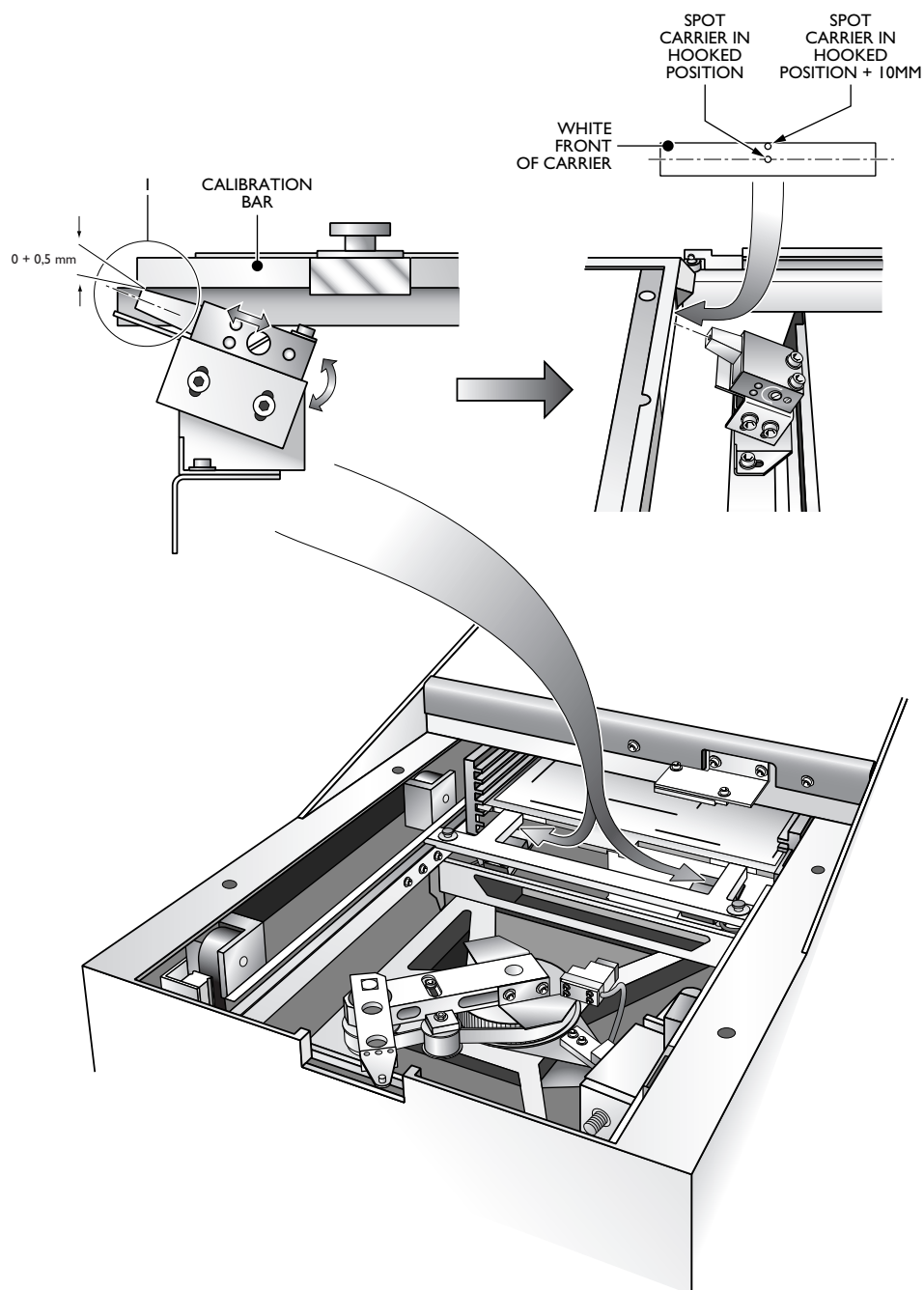


Figure 25 Light spots visible on white carrier front (ACM tray trolley shown)

SD-269cz.eps

H6-00008.fm

## H6.11 Snap-in zero coarse EPD B10 adjustment for 'lock' position

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

### 1. Prerequisites

- Power down the machine.
- Connect the tray trolley to the machine with the extension cable [H6.2 Tray trolley, connecting with extension cable](#)

### 2. Adjusting

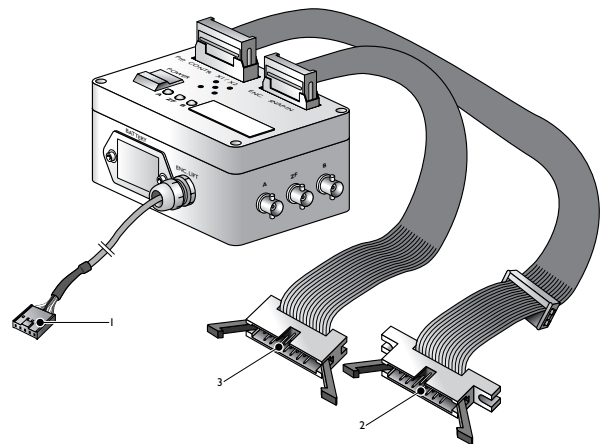
- Make sure that the distance at 'D' =  $22^{+0,5}$ mm by rotating the snap-in spindle manually.

### 3. Connecting the encoder tester to snap-in encoder

- Remove snap-in encoder cable and connect encoder tester (?).
- Power up the machine.

### 4. Adjust

- Rotate the spindle manually, counter clockwise (1 in FIGURE 8A-52) - seen from the front of the tray trolley -  $D < 22$ mm, until the first index puls.
- Mark the spindle and rotate the spindle 180 degrees clockwise (2 in FIGURE 8A-52) seen from the front of the tray trolley.
- Adjust the EPD (1 in FIGURE 8A-54) (LED H13 at the piggyback board) until it is just active. (Clearance of the EPD  $0.5 \pm 0.2$ mm.)
- Rotate the spindle clockwise (2 in FIGURE 8A-52, seen from the front of the tray trolley) until the first index puls after activating the zero coarse EPD.
- Check if the parallelism of the puller arm tip (see 8A.6.2.3.6) is within  $0.4 \pm 0.2$  mm.



H6-00018.fm

## H6.12 Puller catch pin parallelism adjustment

Estimated time to complete [min.]: ?

Required special tools. . . . . ?

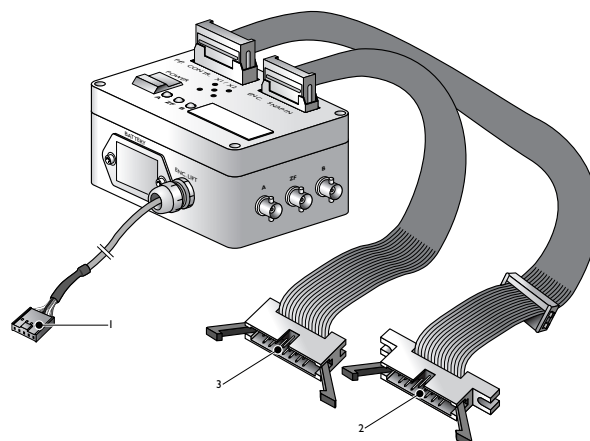
Required part(s) . . . . . ?

### 1. Prerequisites

- Connect the tray trolley to the machine with the extension cable, see [H6.2 Tray trolley, connecting with extension cable](#)

### 2. Connecting the encoder tester to snap-in motor

- Power down the machine.
- Connect encoder tester (3).
- Power up the machine.



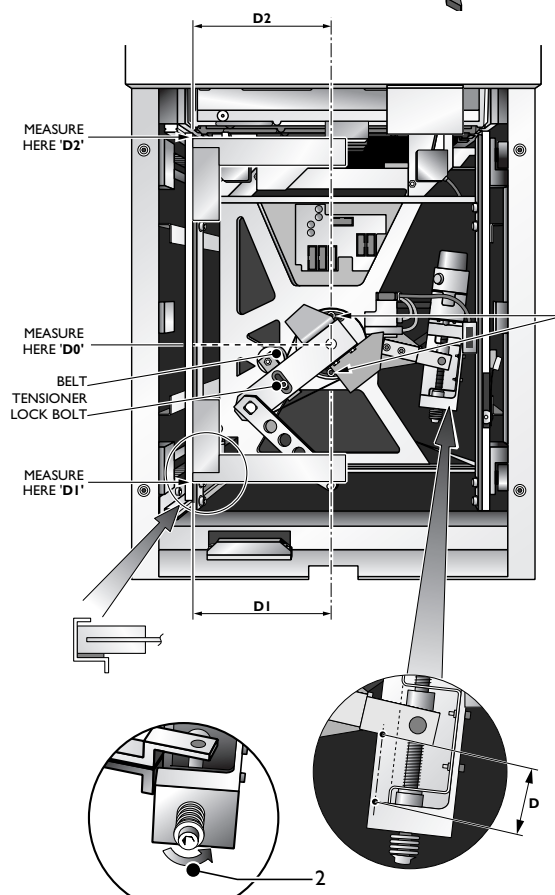
### 3. Check the parallelism of the puller catch pin with respect to the right guide rail

- Place a square hook or steel ruler between the guides.
- Ensure that the puller is in the lock position (snap-in) by rotating the spindle as indicated (2), until the first index puls after the zero coarse EPD is activated, see [H5.3.1 Tray trolley controller, LED status check](#), LED H13.

**Note:** The index pulse can be read from the encoder tester.

**Note:** During movement of the puller arm the position of the snap-in can change!

- Make sure the spindle of the snap-in motor does not rotate. The zero-fine position must stay in place.
- Measure the position of the puller catch pin at the middle position (D0).
- Measure the position of the puller catch pin at 'D1' and 'D2'. This should be 'D0' ± 0.4 mm.
- Adjustment is done by slightly loosening the 2 bolts (1) and rotating the complete puller arm.
- Tighten all bolts.



### 4. Finalize

- Adjust the puller drive belt [H6.19 Puller motor timing belt, adjustment](#)
- Calibrate the tray trolley, see [H6.20 Tray trolley, calibrating](#).
- Power down the machine.
- Reconnect the encoder.

H6-00016.fm

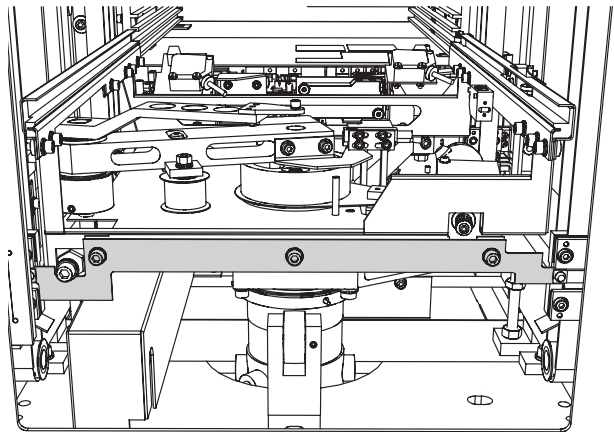
## H6.13 Lift in tray trolley alignments

### 1. First check

- Check if the 2 small strips on the front- and rear side of the lift-assy are not deformed (see Figure 5).
- When deformed, the trolley has to be send back for repair.

### 2. How to repair the tray trolley in case of misalignment of the lift

- There are 5 different situations of misalignment of the lift:
  - \* Front-back misalignment
  - \* Left-right misalignment.
  - \* One-corner misalignment.
  - \* Shifted in x- or y-direction.
  - \* Rotated around the z-axis.



### H6.13.1 Parallelism between puller-arm and lift-assy, adjustment

Estimated time to complete [min.]: ?

Required special tools . . . . . 4022 5320 737.0 "adjusting jig puller.

Required part(s) . . . . . -

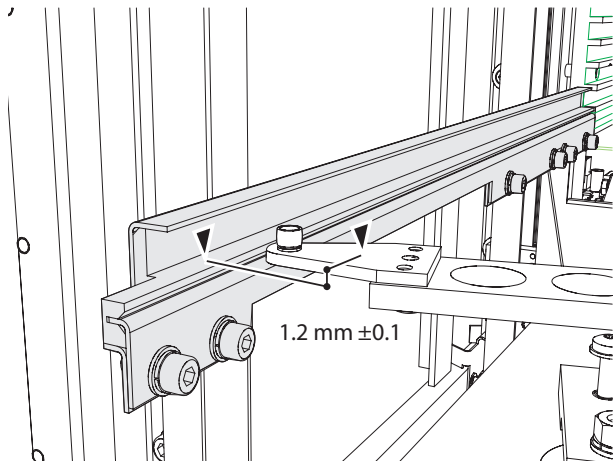
### 1. Prerequisites

- Slacken the puller motor timing belt ([H6.19 Puller motor timing belt, adjustment](#)) in order to freely move the puller arm to the four corners.

### 2. Check

The puller tip movement area has to be parallel to the tray carrier area. This is the plane between the two side guides.

- Use tool 4022 5320 737.0 "adjusting jig puller.
- Move the puller arm manually to each of the four corners and measure the distance between upper side of guiding surface and topside of puller arm (not the tip).
- This should be on all four corners  $1.2\text{mm} \pm 0.1\text{mm}$ .



H6-00017.fm

### 3. Adjustment

- Adjustment is done by loosen the side guides and adjust as much as necessary.

### 4. Finalize

- Adjust the puller motor timing belt, see [H6.19 Puller motor timing belt, adjustment](#)

## H6.13.2 Front-back misalignment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

### 1. Check

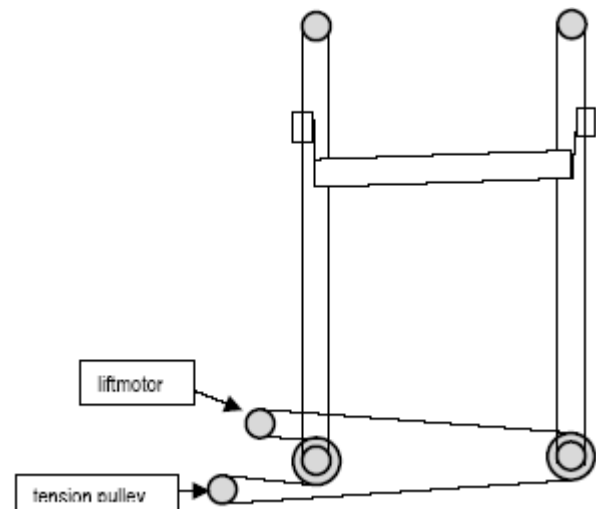
- When the lift is tilting the driving belt of the lift-motor is lifted over his teeth. This can be caused by a component jammed between the belt and the pulley or when the tension on the belt is not enough.
- Check lift straightness compared to the trolley frame using two strips. First check straightness of the counterweights.

### 2. Correction

- Make sure the belt and timing belt pulleys are marked (see Figure 10).
- Check which side (front- or rear-side) is shifted.
- Release belt, see [H6.18 Drive belt of tray trolley lift, adjustment](#)
- Rotate the axle of the vertical lift-movement of the front or rear-side, without moving the drive belt.
- The teeth of the belt have to be shifted over the pulley.

### 3. Finalize

- Adjust the timing belt, see [H6.18 Drive belt of tray trolley lift, adjustment](#)



H6-00017.fm

### H6.13.3 Left-right misalignment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

#### 1. Check

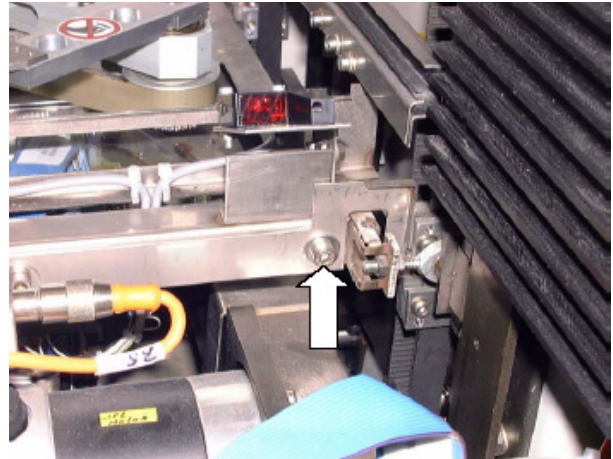
- Check lift straightness compared to the trolley frame using two strips. Then raise lift to upper position and measure the four corners. These values have to be the same.

#### 2. Adjustment

- Very small adjustment can be done by slightly loosen the three bolts of the small metal strip on front or rear-side wherewith the lift-plate is mounted between the vertical timing belts.

#### 3. Adjustment

- When there is a large misalignment it is caused by the shifting of the vertical timing belts over their pulleys.
- Release vertical lift belt, see [H6.17 Vertical lift belt, adjustment](#)
- Shift the timing belt one or two tooth over its timing belt pulley, to adjust the lift
- Adjust vertical lift belt, see [H6.17 Vertical lift belt, adjustment](#)



### H6.13.4 One corner misalignment

Estimated time to complete [min.]:

Required special tools. . . . .

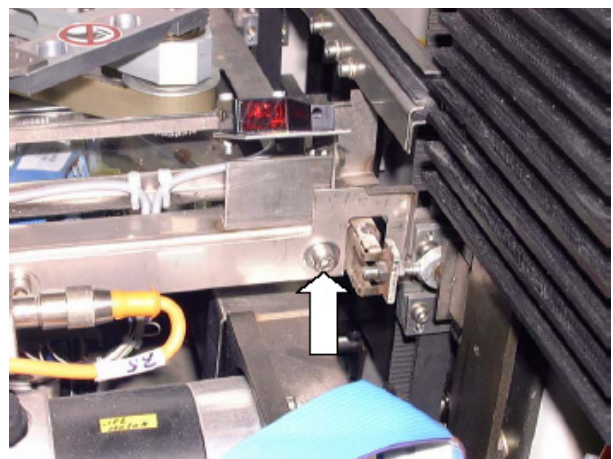
Required part(s) . . . . .

#### 1. Check

- Small misalignment can be adjusted by slightly loosen the three bolts of the small metal strip on front or rear-side wherewith the lift-plate is mounted between the vertical timing belts.
- When there is a large misalignment it is caused by the shifting over the vertical timing belts over their pulleys.

#### 2. Correction

- According to the description on ?, but now just adjust the timing belt pulley in one corner.



H6-00017.fm



### H6.13.5 Shifted in X or Y direction

Estimated time to complete [min.]:

Required special tools. . . . .

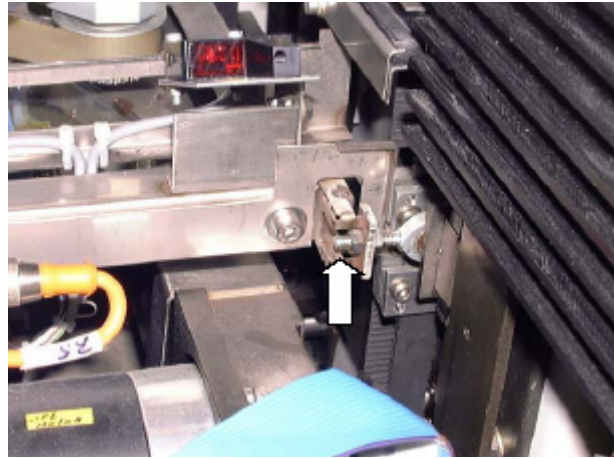
Required part(s) . . . . .

#### 1. Check

- Check position in comparison with a slot in storage area. If not in line, check for deformation of the small strips in front- or rear-side wherewith the lift plate is mounted between the vertical timing belts.

#### 2. Correction

- There is a very small adjustment possible, but be very careful. With this adjustment the liftable is not in the middle between the vertical lift belts.
- Small adjustment can be done by changing the length of the ball-joint screw.



### H6.13.6 Rotated around the z-axis

In this case the small metal strips must be deformed. It is better to replace the complete lift assembly.

### H6.13.7 Final check

The lift assembly should be horizontal again and the counter-weights must be on equal heights.

#### 1. Check

- This can be checked by using the two suspension beams 4022 532 0549.0.
- Measure the distance from topside of the beam to the topside of the guiding rail.
- Compare this value on the four corners of the lift plate assy.
- Adjust EPD puller in stock area, see [H6.3 EPD B01 puller in stock area, adjustment](#)
- Measure and adjust EPD puller tip in stock area and the zero coarse puller, see [H6.4 EPD B02, puller safe / puller zero coarse adjustment](#)
- Calibrate the tray trolley, see [H6.20 Tray trolley, calibrating](#)
- Install jumper X44 to overwrite calibration data.

H6-00017.fm

## H6.14 Puller arm tip, height adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

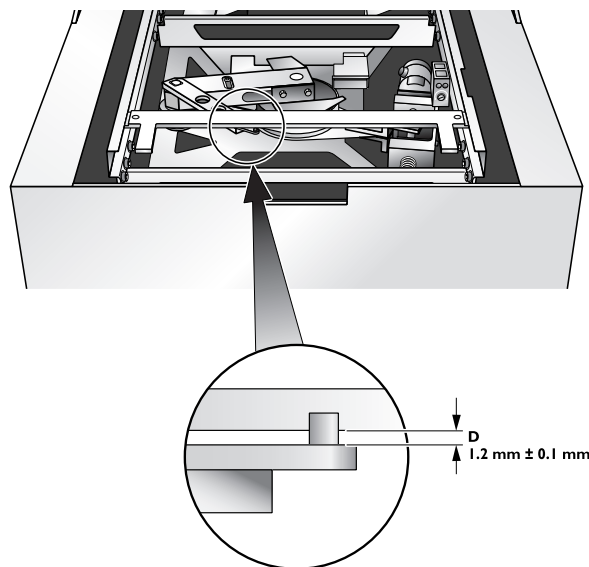
### 1. Prerequisites

- Install the carrier detection adjusting tool between the guides.  
(Remove the two screws of the tool).

**Note:** Make sure to install the carrier detection adjusting tool upside down.

### 2. Adjustment

- Check with a square hook if the puller arm is not bent.
- Replace the puller arm if it is bent.
- Measure the z-distance 'D' ( $1.2 \text{ mm} \pm 0.1 \text{ mm}$ ) at several positions with feeler gauges.
- Correct the height by loosening the adjustment screw of the puller arm (2 in 36).
- Move the puller arm up or down until the distance 'D' is  $1.2 \text{ mm} \pm 0.1 \text{ mm}$ .



H6-00005.fm



## H6.15 Lift stops in tray trolley, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

Four position checks should be made as follows (Figure 26):

Lift-up mechanical stop

1. Move the lift manually to its uppermost position. ( $Z = 0$  of the guide rail equal to the bottom side of the frame).
2. Measure the distance ' $D_1$ ' ( $D_1 = 2.5 + 1 \text{ mm}$ ).
3. If the distance is smaller, check the distance of the counter-weight with respect to the end stop bolt.

Lift-down mechanical stop

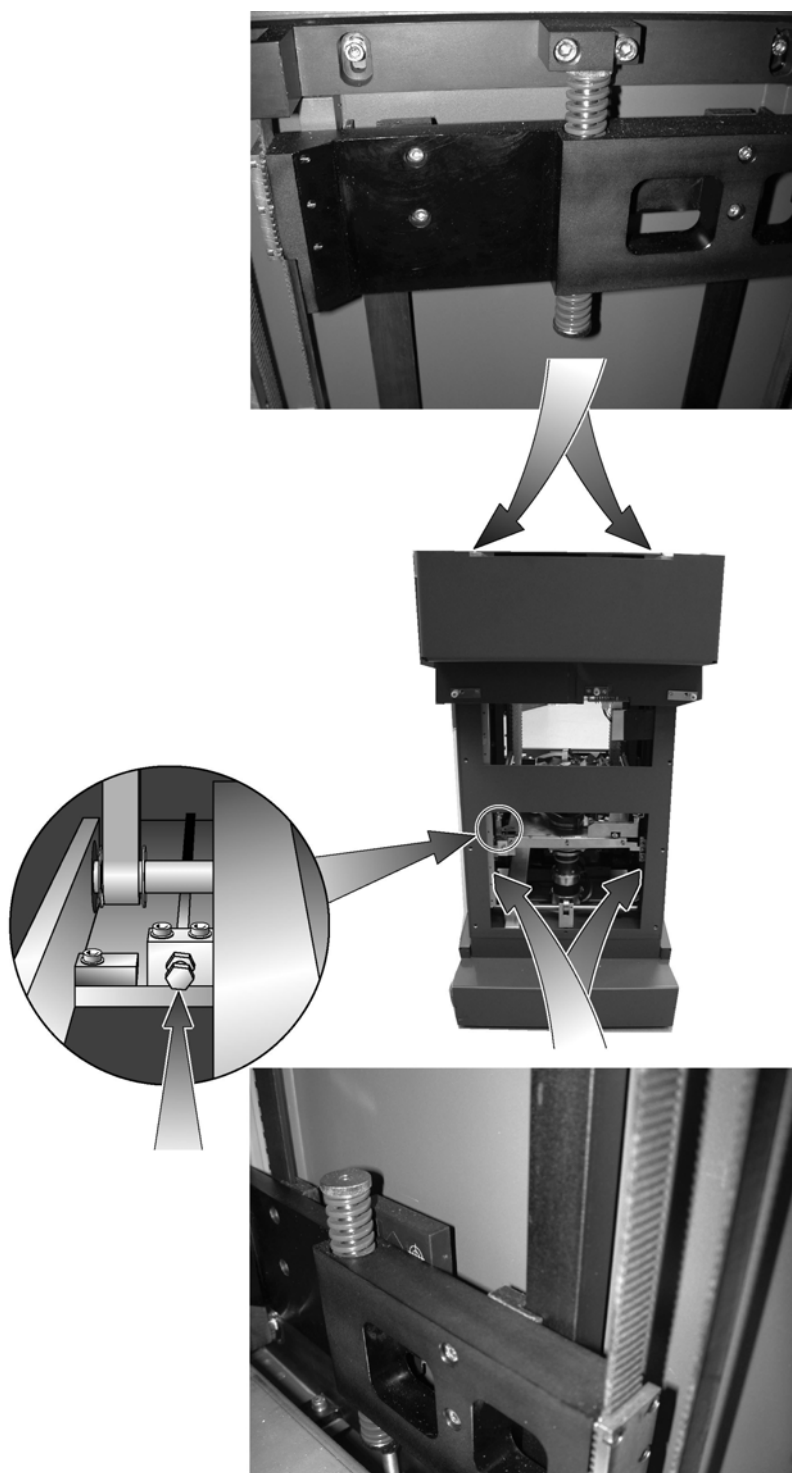
1. Move the lift to slot 47.
2. Measure the distance ' $D_2$ ' ( $D_2 = 2.5 + 1 \text{ mm}$ ).
3. Adjust the distance by moving the counter-weight with respect to the belt.

EPD lift-up

1. Move the lift manually to its uppermost position. ( $Z = 0$  of the guide rail equal to the bottom side of the frame).
2. Check that the EPD has activated.
3. Move the sensor 2 mm down and make sure that the sensor remains active.

Zero fine lift

1. Move the lift manually to its uppermost position. ( $Z = 0$  of the guide rail equal to the bottom side of the frame).
2. Shift the controller outside.
3. Remove the cover plate.
4. Connect the encoder tester to the lift motor encoder.
5. Check that the zero fine signal is present only once during the EPD lift-up signal. The zero fine signal must also be shifted a quarter rotation of the lift motor with respect to the EPD lift-up signal.



*Figure 26 Lift adjustment*

H6-00009.fm

## H6.16 Lift Lock spring, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

1. Move the carrier to the pick position.
2. Measure the distance at 'D' (Figure 27) (to lock the carrier in the pick position the lock spring must be adjusted to  $149.4 \pm 0.2$  mm from the inner side of the frame with respect to the centre of the lock spring).

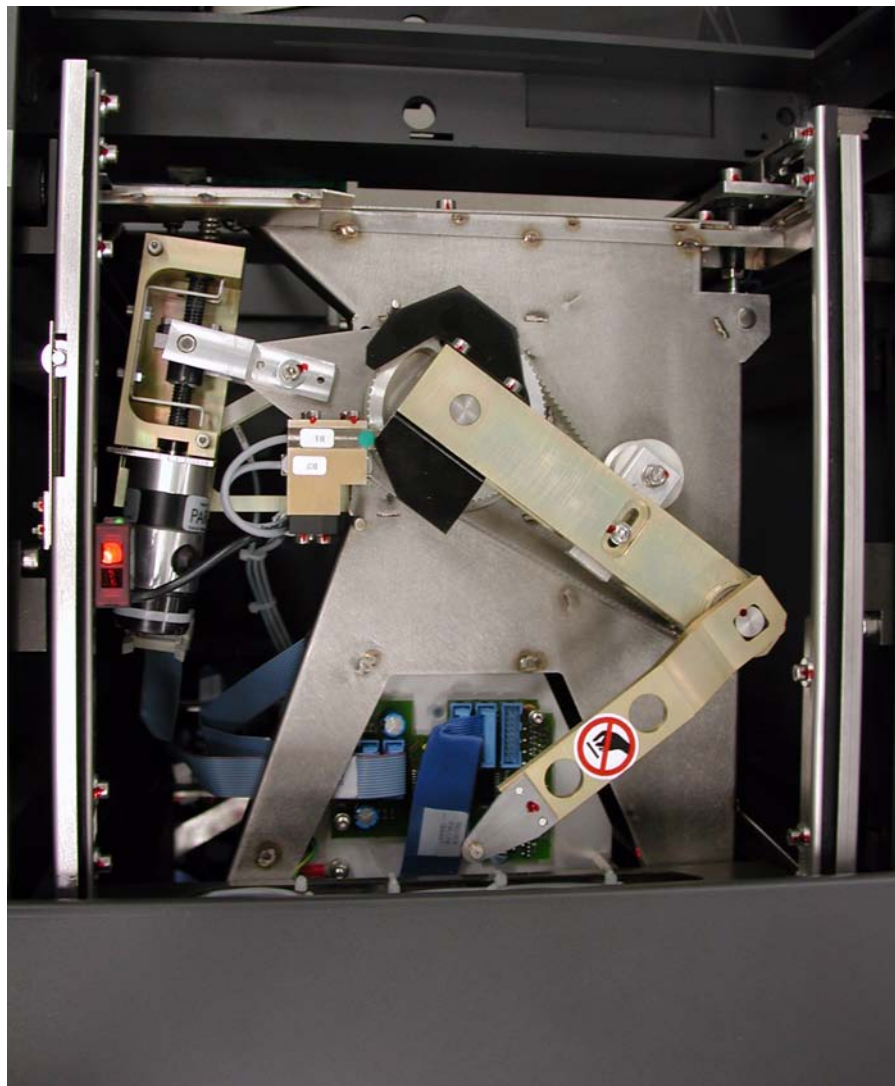


Figure 27 Lock spring adjustment

H6-00010.fm

## H6.17 Vertical lift belt, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

### 1. Prerequisites

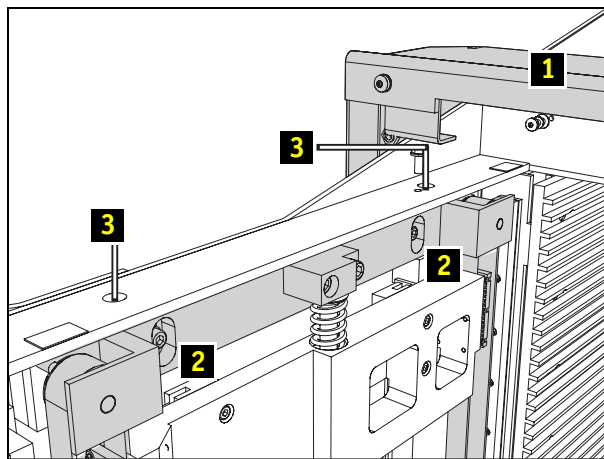
- Remove cover on top of tray trolley (1).

### 2. Adjust the vertical lift belt tension

- Release both bolts (2).
- Adjust the belt tension by turning the Allen bolts (3).
- Check belt tension, see [H7.2 Belts in tray trolley, checking](#)
- Repeat this procedure at the other side.

### 3. Finalize

- Tighten both bolts (2).
- Mount cover (1).



## H6.18 Drive belt of tray trolley lift, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

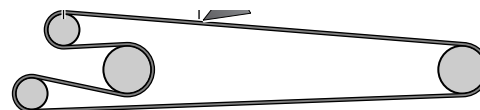
Required part(s) . . . . .

### 1. Prerequisites

- Remove the drive belt cover.

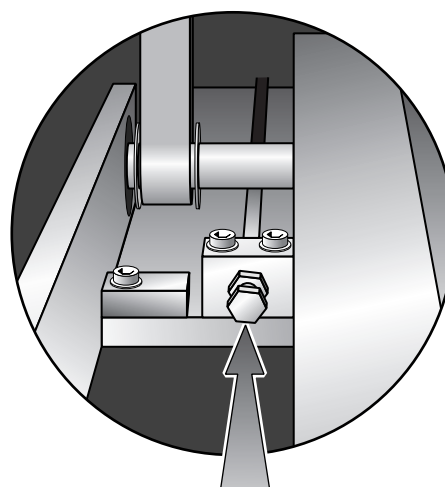
### 2. Adjusting the drive belt

- Check tension of the drive belt, see [H7.2 Belts in tray trolley, checking](#)
- The drive belt can be adjusted by the screws.



### 3. Finalize

- Place the drive belt cover back.
- When fastening the cover, take care not to touch the axes.



H6-00013.fm

## H6.19 Puller motor timing belt, adjustment

Estimated time to complete [min.]:

Required special tools. . . . .

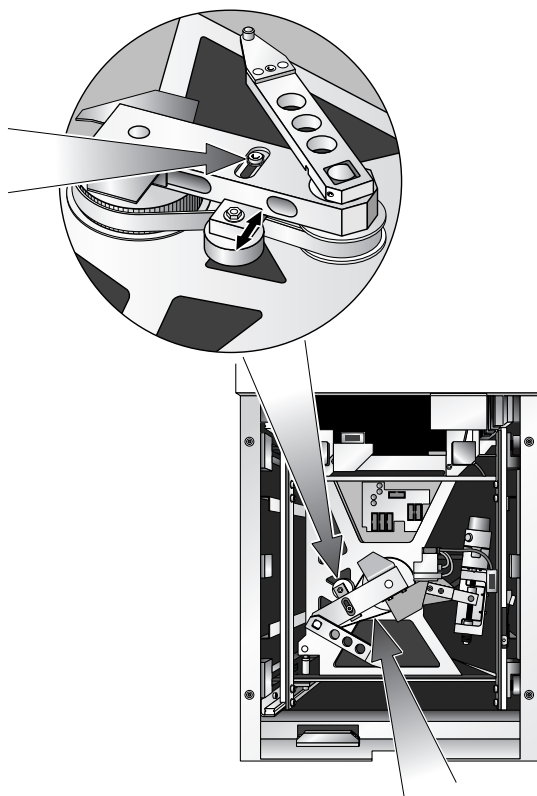
Required part(s) . . . . . Belt tension indicator

### 1. Prerequisites

•

### 2. Adjusting the puller motor timing belt

- Check tension of the puller motor timing belt, see [H7.2.Belts in tray trolley, checking](#)
- Loosen adjustment screw of spring tensioner, apply hand pressure to the tensioner and tighten adjustment screw and check tension again.



H6-00014.fm

## H6.20 Tray trolley, calibrating

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

**All manual servo actions must be performed with doors closed and emergency switches pressed.**



### ESD SENSITIVE ELECTRONICS

Electro Static Discharge may cause damage to electronics.

Work in an ESD safe environment or use ESD preventive measures.

### 1. Prerequisites

- Performed all the necessary adjustments first.
- The tray trolley must be connected to the system via an extension cable [H6.2 Tray trolley, connecting with extension cable](#) ).
- Power up the machine, the calibration program runs via the process controller.

### 2. Start-up TIP tools

- Log on to system as an Administrator (see ?)
- Wait until the status window of the process controller is disappeared (This means the aPC is booted)

**Note:** If it takes longer than 5 minutes for the aPC Status window to disappear it is possible that the aPC booted before the boot procedure of the aSC was finished. In that case one could also continue to the next step.

- Double-click the icon "VNC APC" on the desktop to start the Vnc program
- Wait until the desktop of the aPC becomes visible.

**Note:** If the program could not connect to the aPC it will give a warning. This means the aPC is probably not booted yet, wait a few seconds and try again.

- On the desktop of the aPC double-click the icon "Start aPC processes for TIP". This will start only those processes that must run for the use of the tiptools.
  - On the desktop of the aPC double-click the icon "TIP tools" to start the tiptools.
  - Enter: get programs.tip
  - Select: < option C > (see chapter 10.2.2)
  - At the question: "Do you want to test Nodes?" press "No "
- Following message appears on screen: "An AQ Tray Trolley with 47 carriers is detected. Type any key to continue."

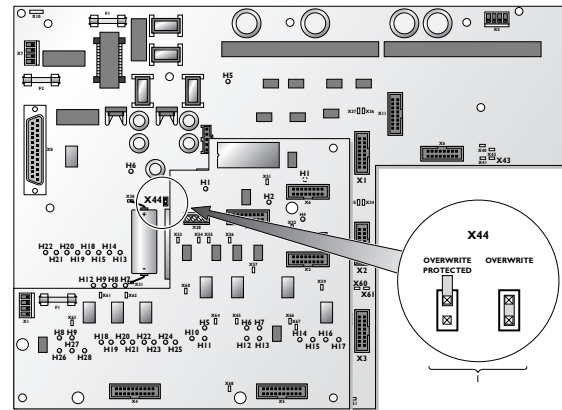
**Note:** Make sure to press the "Enter" key only once. Otherwise you are one step ahead. This can lead to a wrong calibration.

- Follow the sequence given in following procedure.

H6-00015.fm

### 3. Clear the calibration values in tray trolley

- Get access to the tray trolley controller, see [H8.1 Tray trolley controller, replacement](#)
- Install jumper X44 to overwrite calibration data. Servo power must be on.
- Select N (new controller).
- Select A (purge flash prom).
- Select C (reset all parameters in flash prom). Default values loaded from software.
- Select 0 (exit).



### 4. Lift calibration

- Select C (calibration).
- Select A (calibrate lift offset).
- Press any key to start initialising.  
Message: *'Trolley initialises'*
- Press any key to switch off amplifiers.  
Message: *'Amplifiers switched off'*

### 5. Zero position of tray trolley lift calibration

- Push the emergency stop to release the servo power.
- Message: *'Move lift manual to zero position and press enter key when finished'*
- Place the calibration tray in the first slot.
- Use the aluminium calibration tray to match the lift height to the store height of the calibration tray.
- Check that the aluminium calibration tray moves smoothly from the store into the lift and vice versa.



**Note:** No bumps are allowed!

- Press any key.
- When finished move the tray back in the stock area and move the puller arm back to the safe position.
- New zero offset written into RAM.



## 6. Calibrating the pick position

Message: 'Move lift manually to pick position'.  
'Press any key when finished'.

- Adjust Z-calibration tool to  $3 \pm 0.05$  mm.
- Place Z-calibration tool and secure it with the two screws (1).

**Note:** Check if the extension tables are not clamped between tool and trolley frame.

- Manually load calibration tray in pick area.

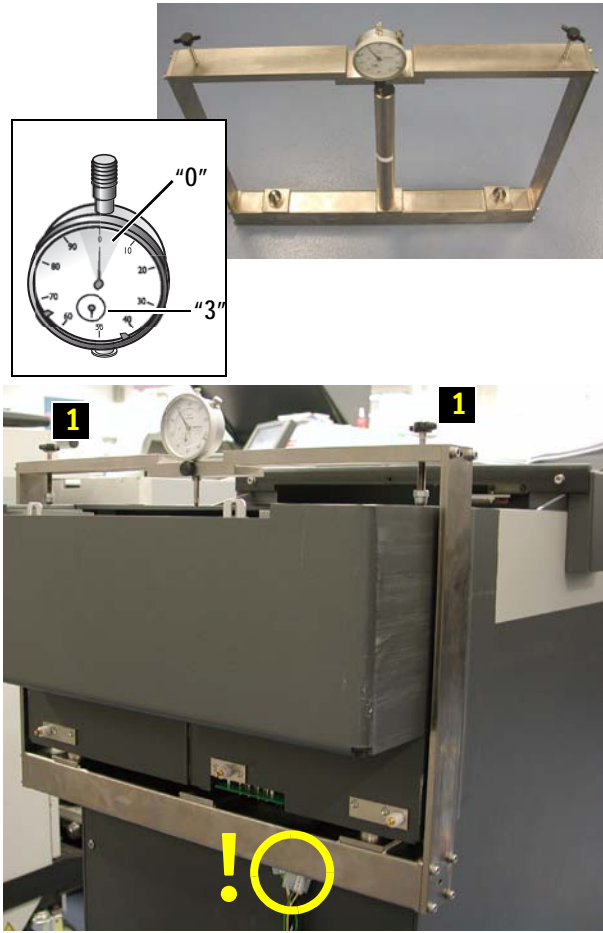
**Note:** Do not bend the puller arm!

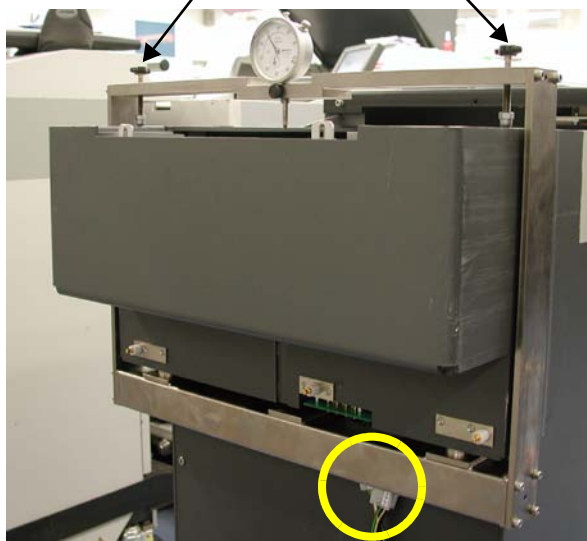
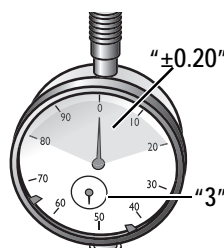
- Raise the lift manually and make sure that the gauge tip touches the calibration tray just behind the aluminium strip.
- Keep the lift in the position where the gauge reads  $3 \pm 0.2$  mm, and press any key.

Message: 'New pick position written into RAM.'

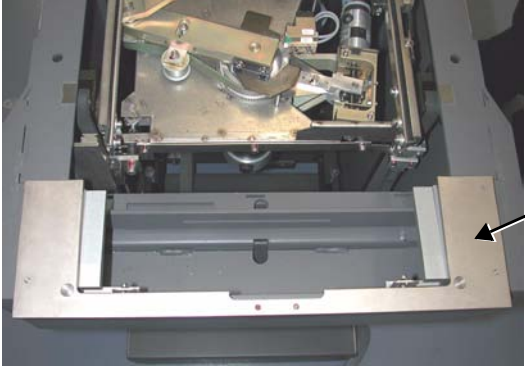
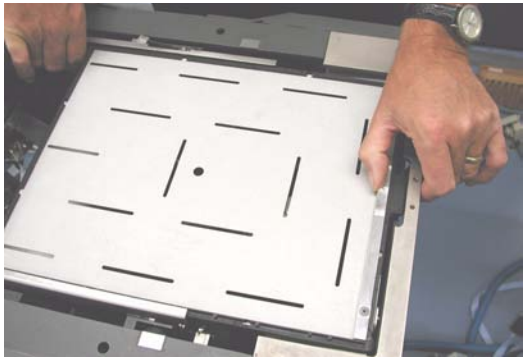
- Select W (write to flash prom)
- Write down the values for:
  - \* 'lift offset' .....
  - \* 'pick position'...
- Switch on servo power, by pulling the emergency key
- Select R (Read pos. flash prom)
- Verify these values with the noted values.
- Remove tray manually.
- Place tray back in store and move puller arm to a safe position.
- Remove the Z-calibration tool.

**Note:** Do not bend the puller arm.

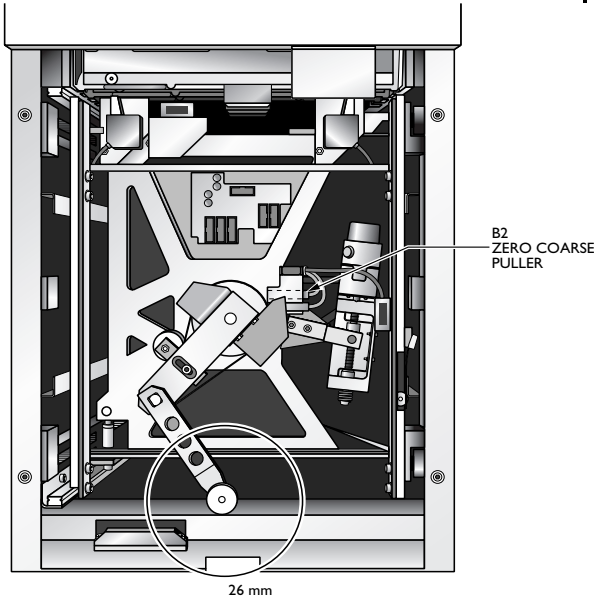
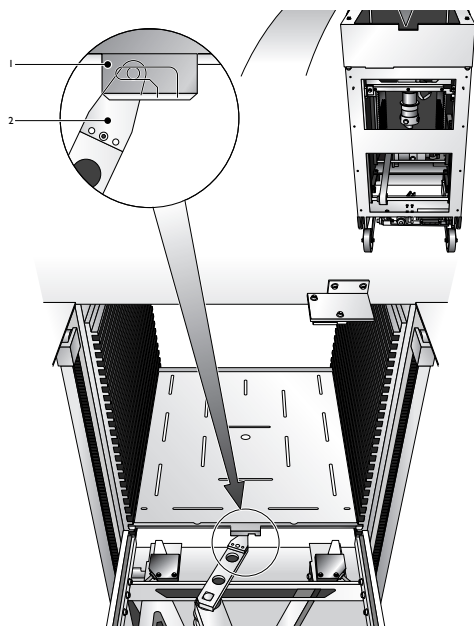


PC ACTION	MANUAL ACTION	ACTION VISUALISED
Pick position		
<p>Message: Move lift manually to pick position. Press any key when finished.</p>	<p>Place Z-calibration tool and lock it with the two screws (see arrows in the picture).</p> <p>Note: Check if the extension tables are not clamped between tool and trolley frame.</p>	
	<p>Manually load calibration tray in work area Trolley. Do not bend the puller arm!</p>	
	<p>Raise the lift manually and make sure that the gauge tip touches the calibration tray just behind the aluminium strip. Keep the lift in the position where the gauge reads <math>3 \pm 0.2</math> mm, and press any key.</p> 	
<p>Message: New pick position written into RAM.</p>		
Select W (write to flash prom)	<p>Note down all values (lift offset and pick position).</p>	<p>Lift offset1097 Real lift position-517 Pitch position575 Hook position0 Eject position150 Pick position-517 Lever zero position0</p> <p>Note: The values shown here are just an indication.</p>
Switch on servo power.	Pull the emergency key!	
Select R (Read pos. flash prom)	<p>Verify these values with the noted values. Remove tray manually. Place tray back in store and move puller arm to a safe position. Remove the Z-calibration tool. Do not bend the puller arm!</p>	

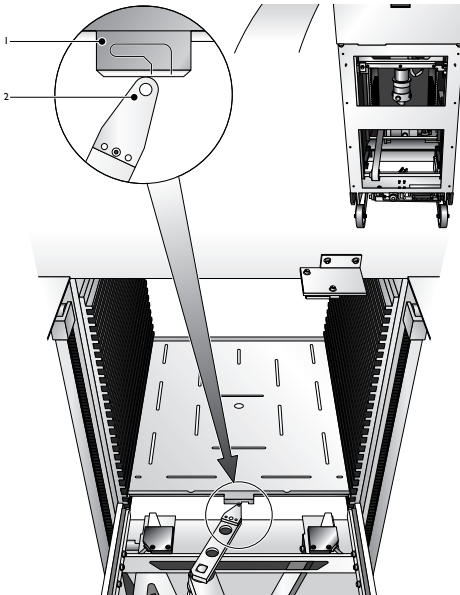
H6-00015.fm

PC ACTION	MANUAL ACTION	ACTION VISUALISED
Puller		
Select S (select servo).		0, 1, 2 make your choice.
Select 1 (puller).		
Select A (calibrate puller offset).		
	Check the following: - Is the door closed? - Are the trays in position (laser sensors not activated)? - Is the servo power on?	
Message: Press any key to start initialising.	Trolley initialises.	
Message: Press any key to switch off the amplifiers.	Amplifiers switched off.	
	Push the emergency stop to release the servo power.	
Message: Move puller manual to pick position. Press any key when finished.		
	Place the Y-calibration tool (1)	
	Move and hold the puller manually to the pick position. To do so, load the calibration tray in the work area. Move and hold the calibration tray as far as possible to the pick position. Push the tray fully in against the tool. Do not lower the lift as this could damage the puller. The tool is positioned with dowel pins.	
Message: Press Enter to write new pick position to RAM		
Message: New pick position written into RAM		


H6-00015.fm

PC ACTION	MANUAL ACTION	ACTION VISUALISED
	Return the calibration tray into the store manually and remove the Y-calibration tool.	
<p>Message: Manually move puller to the lift position.</p>	<p>Install 26 mm adjustment ring</p> <p>Move and hold the puller manually to the lift position with the lift at tray position 14.</p> <p>The snap-in motor is in the lock position after previous calibration (if not touched, it is OK).</p> <p>Do not bend the puller arm!</p> <p>Press any key.</p>	 <p>B2 ZERO COARSE PULLER</p> <p>26 mm</p>
<p>Message: Press Enter to write new lift position to RAM.</p>		
<p>Message: New pick position written into RAM.</p>		
	Remove 26mm ring and move puller to a safe position.	
	Install a calibration tray in position 23.	
<p>Message: Move puller manual to hook position. Press any key when finished.</p>		
	<p>Move puller to the hook position and hold the puller manually.</p> <p>Do <b>NOT</b> change or rotate motor position snap-in!</p> <p>Press any key.</p>	

H6-00015.fm

PC ACTION	MANUAL ACTION	ACTION VISUALISED
Message: New hook position written into RAM.		
Message: New park position written into RAM.		
Message: Move puller manual to eject position. Press any key when finished.	<p>Move the puller manually to eject position. Move calibration tray to the eject position. Push the puller arm tip (not the puller catch pin!) against the calibration tray [at position 23] (snap-in lock position). Press any key.</p> <p><b>NOTE:</b> When the tray is ejected, it is pushed out with the puller arm tip and not with the puller catch pin.</p>	
	<p>Note all values. Press Enter to write new eject position to RAM.</p>	<div><div><p>Puller offset0 Real pull position14692 Lift position990 Pitch position10606 Hook position14006 Eject position14692 Pick position-5658</p></div><div><p>Note: The values shown here are just an indication.</p></div></div>
Message: New eject position written into RAM.		
	Return puller arm to safe position.	
Select W (write to flash prom)		
	Reset the servo power, pull emergency key.	
Select R (Read positions from flash prom)	Verify these values with previous noted values.	

H6-00015.fm

PC ACTION	MANUAL ACTION	ACTION VISUALISED
Snap-in		
Select S (servo)		
Select 2 (Snap-in)		
Select A (Calibrate snap-in positions)		
	Check the following: - Is the door closed? - Are the trays in position? - Is the servo power on? - Is the puller arm safe?	
Message: Press any key to start initializing.		Trolley Initialises
Message: Press any key to switch off amplifiers.		Amplifier switches off.
	Press emergency key	
	Install the calibration tray in position 23.	
Message: Move the snap-in to the free position. Press key when finished.	Turn the snap-in until the snap-in pin falls into the free position (the narrow right slot) see picture. Press any key.	

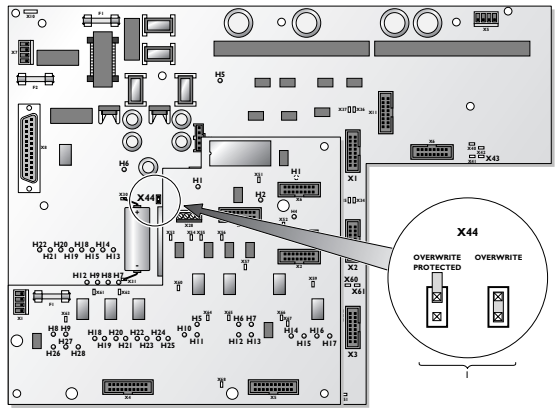
PC ACTION	MANUAL ACTION	ACTION VISUALISED
Press Enter to write new free position to RAM.		
Message: New Free position written into RAM.		
	Move puller to save position.	
Select W (write to flash prom)	Note all values.	Snap offset0 Real snap-in position14692 Free position9237 Lock position10606  Note: The values shown here are just an indication.
	Pull emergency key.	
Select R (Read positions from flash prom)	Verify these values with previous noted values.	
Select 0 (exit)		
	Wear an ESD bracelet! Place jumper in write-protected position. Place back controller and fasten screws. Close door.	
	Remove the calibration tray.	
Perform an endurance test (10 minutes): - Select E - Select P - Select H: tray position 5 - Enter - Select I: tray position 36 - Enter - Place trays in position 5 and 36. - Select A (start endurance) - Run endurance test for the required period - Press control C to stop endurance.		

Figure 28 Tray trolley calibration

## H6.20.1 Log off procedure

To log off, use the following procedure:

1. At prompt >>> type: exit or close window with mouse pad (x)
2. After using the tiptools double-click the icon "Kill APC Processes" to stop all running APC processes.
3. Close "VNC aPC"

H6-00015.fm

4. Shutdown NT on aPC and aSC by double-click on the power-down icon. This icon is located on the aSC.

**REMARK:** Remark: This is the most save method for shutting down the aPC an aSC. Do not use shutdown in windows you will shutdown only aPC or aSC depending which desktop current is.

5. Restore the automatic log on procedure (see 10.2.1.3)

## H6.20.2 Read flash prom calibration values

The calibration values of the tray trolley can be saved on disc (aPC) and later-on be saved via FTP on floppy for a print usage.

Start-up TIP tools:

1. Log on as Administrator (see chapter 10.2.1)
2. Wait until the aPC Status window is disappeared (This means the aPC is booted)  
If it takes longer than 5 minutes for the aPC Status window to disappear it is possible that the aPC booted before the boot procedure of the aSC was finished.  
In that case one could also continue to the next step.
3. Double-click the icon "VNC APC" on the desktop to start the Vnc program
4. Wait until the desktop of the aPC becomes visible.



**NOTE:** If the program could not connect to the aPC it will give a warning. This means the aPC is probably not booted yet, wait a few seconds and try again.

5. On the desktop of the aPC double-click the icon "Start aPC processes for TIP".  
This will start only those processes that must run for the use of the tiptools.
6. On the desktop of the aPC double-click the icon "TIP tools" to start the tiptools.
7. Enter: `get programs.tip`
8. Select: < option A - E > (see chapter 10.2.2)
9. At the question: "Do you want to test Nodes?" press "NO"
10. enter: `get fctflash.tip`
11. Give section nr: enter the required section number
12. enter: `save_flash`

The file is saved in `c:\user\apc\work\FCTflash.txt`

To read the file, browse with explorer and double-click on *FCTflash.txt*

For the log off procedure, please see section [H6.20.1](#).



## CHAPTER H7 Maintenance instructions



**NOTE:** Only a regional service engineer is allowed to remove a sealed bolt. After replacing the bolt, it needs to be sealed again. Therefore Loctite 7400 coating is required. In general, when a sealed bolt has been replaced it needs re-adjustment.

### H7.1 Required Equipment

- Standard tool set;
- Vacuum cleaner;
- Fibre free tissue;
- Isopropanol (99.7% pure, de-naturalized by 5% methanol);
- Lithium based grease;
- De-greasing/Cleaning spray;
- Multimeter;
- Grease gun;
- Belt tension indicator (30Hz - 500Hz);
- Lens tissues.



**NOTE:** When the system is switched off by means of the main switch, this main switch must always be locked by a padlock!



**WARNING:** The tray trolley contains two laser sensors. These laser sensors are class II lasers and can cause serious injuries. Therefore, don't look into the laser beams.

**WARNING:** Before starting maintenance work, operate correct system shut-down procedures and switch off the factory power at the main power switch.

**WARNING:** Isopropanol is poisonous and highly flammable. Observe the manufacturer's safety precautions when using isopropanol.

**CAUTION:** Never use compressed air to clean. Waste can be blown into fine mechanical parts causing damage or malfunctioning.

**CAUTION:** To avoid component damage by ESD, connect body mass to an ESD point before starting maintenance on the system.

### H7.1.1 Required Maintenance Tray trolley

ITEM	ACTION	LOADING	REMOVAL	6-MONTHLY
Tray trolley:	8A.7.5			
Calibration markers		Check		
LED captions		Clean		Check
Snap-in spindle				Lubricate
Safety switch		Check		
Door contact		Check		
Cooling fan		Check	Clean	
Micro switches		Check		
Connector		Check		
Connector linkage		Check		Lubricate
Roller bearings		Check		Lubricate
Proximity shock absorber		Check		Lubricate
Controller status LEDs		Clean		Check
Puller motor belt				Check
Lift motor belt				Check
Lift motor brake				Check
Lift conveyor belts				Check

Figure 29 Maintenance periods



**NOTE:** When lubricating or cleaning with isopropanol, make sure to wear gloves to avoid skin contact.

- Clean trolley interface surface with a vacuum cleaner and fibre free tissue moistened with Isopropanol.
- Circuit breaker
  - Open circuit breaker F1 and connect a voltmeter between pins 1 and 2 of connector X2, voltmeter should read 0V;
  - Close circuit breaker F1, voltmeter should read battery voltage (12V fully charged).
- Calibration markers
  - Clean the markers using fibre free tissue moistened with Isopropanol.
- LED captions
  - Clean the captions using fibre free tissue moistened with Isopropanol;
  - Check the captions for signs of damage and replace where the identification is illegible.

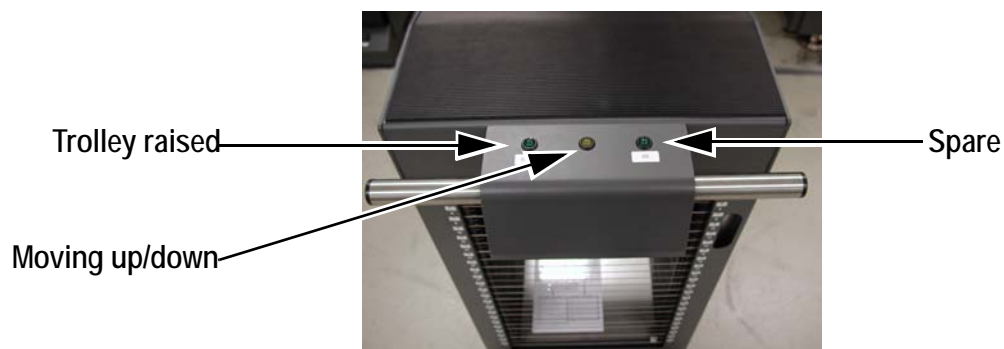


Figure 30 Hoist status LEDs

H7-00001.fm

- Snap-in spindle
  - Clean the snap-in spindle using de-greasing spray and fibre free tissue;
  - Lubricate the spindle lightly with NSK grease no. 2.
- Door contact
  - Check door contact operation by connecting a multi meter to contacts 67 and 68 of hoist terminal block X101;
  - Close contact, multi meter must show a closed circuit;
  - Repeat procedure for contacts 5 and 2 at hoist I/O connection X2.
- Cooling fan
  - Clean cooling fan blades using fibre free tissue and Isopropanol;
  - Check cooling fan operates when trolley is connected to the placement system.
- Connector 'Pogo Pin'
  - Check connector contacts for signs of damage;
  - Ensure movement of swivel arm is smooth and brings the connector into a lateral position when fully extended.
- Connector linkage
  - Clean connector linkage, slide and bearing using de-greasing spray and fibre free tissue;
  - Lubricate linkage slide and bearing lightly with grease.
- Roller bearing
  - Clean roller bearing using de-greasing spray and fibre free tissue;
  - Lubricate tie bar bearings lightly with grease.
- Controller status LEDs
  - Clean the controller status LEDs using fibre free tissue and Isopropanol;
  - Check the LEDs illuminate (Figure 31).

LED	ON	OFF
Yellow	Controller error	Normal operation
Green	Normal state	Endurance state

Figure 31 Controller - status LEDs

- Lift motor brake
  - Operate the lift and ensure that the motor brake operates when the motor stops (a faulty motor brake will allow easy hand movement of the drive);
  - Replace complete lift motor if brake is faulty.

## H7.2 Belts in tray trolley, checking

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . . Belt tension indicator

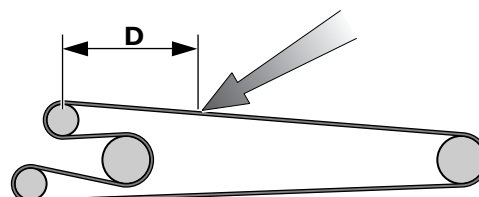
Using a, check each belt for tension (Figure 32).

BELT	FREQUENCY	D
Vertical lift belt	78Hz - 82Hz	30 cm
Lift motor timing belt	58Hz - 62 Hz	36 cm
Puller motor timing belt	$300 \pm 40$ Hz	-
Hoist motor timing belt	$100 \pm 10$ Hz	-

Figure 32 Belt tensions

### 1. Drive belt of tray trolley lift

- Check that the tension of the drive belt is  **$58 \pm 4$  Hz** at **D=36 cm**;
- Adjust if necessary, see [H6.18 Drive belt of tray trolley lift, adjustment](#)
- Replace belt when worn or if no further adjustment is possible, see [H8.5 Drive belt of tray trolley lift, replacement](#)



### 2. Vertical lift belts

- Check that the tension of the vertical lift belts is  **$78 \pm 4$  Hz** at 30 cm;
- Adjust if necessary, see [H6.17 Vertical lift belt, adjustment](#)
- Replace belt when worn or if no further adjustment is possible, see [H8.7 Vertical timing belt in tray trolley, replacement](#)

### 3. Puller motor belt

- Check that the tension of the puller motor belt is **300 ± 40 Hz**;
- Adjust if necessary, see [H6.19 Puller motor timing belt, adjustment](#)
- Replace belt when worn or if no further adjustment is possible, see [H8.6 Puller motor timing belt, replacement](#)

## H7.3 Tray trolley sensors, cleaning

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . .

---

1.

H7-00003.fm

H7.4 Safety contacts in tray trolley, cleaning

Estimated time to complete [min.]:  
Required special tools. . . . .  
Required part(s) . . . . .

1.

H7-00004.fm

## CHAPTER H8 Installation and replacement instructions

### H8.1 Tray trolley, replacement instructions



NOTE: Only a regional service engineer is allowed to remove a sealed bolt. After replacing the bolt, it needs to be sealed again. Therefore Loctite 7400 coating is required. In general, when a sealed bolt has been replaced it needs re-adjustment.

When the system machine is switched off by means of the main switch, this main switch must always be locked by a padlock!

Before removing system components, operate correct shut-down procedures and switch off the factory power supply at the main switch.

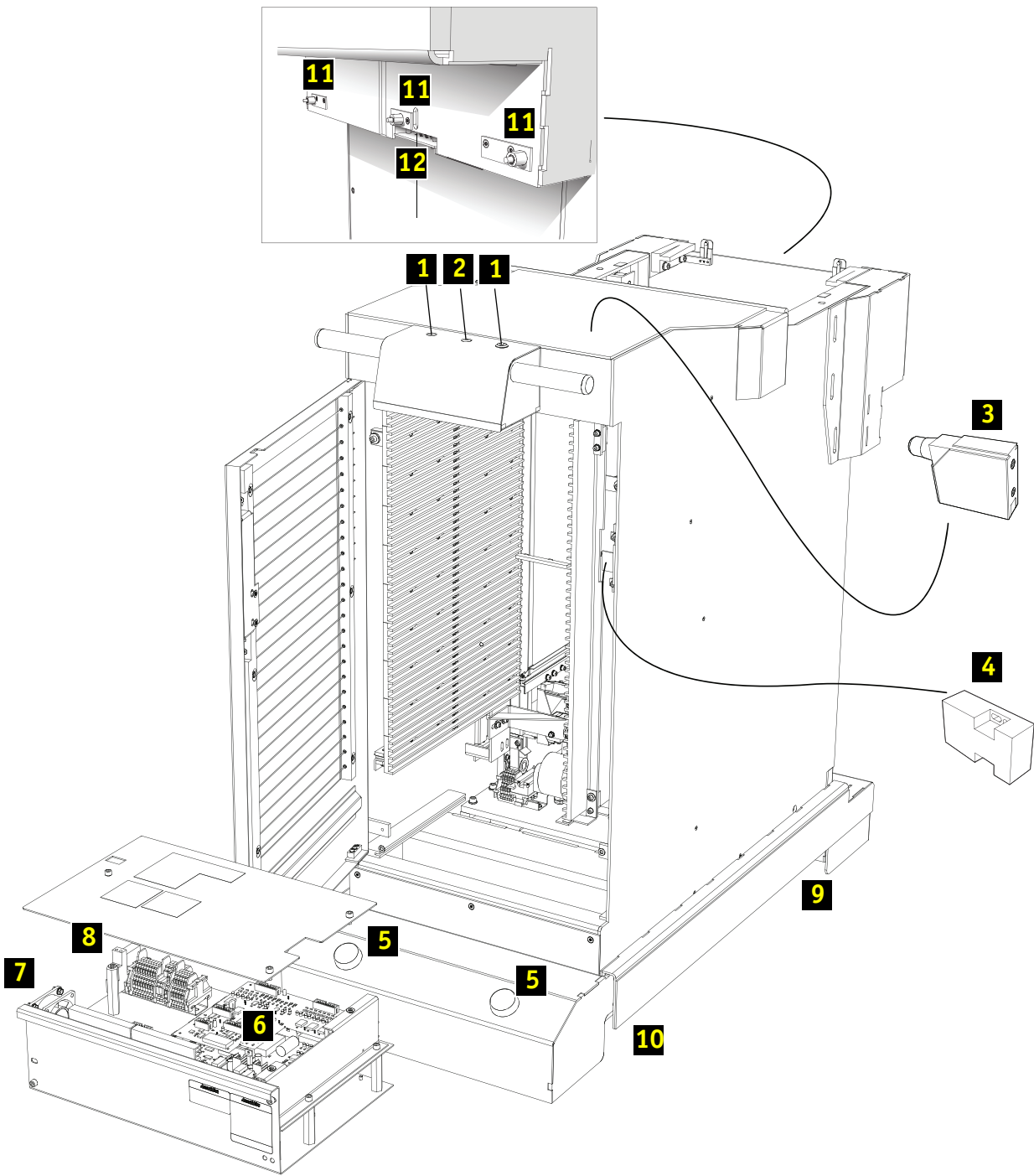
To avoid component damage by ESD, connect body mass to an ESD point before starting maintenance on the trolley or the system.



H8-00001.fm

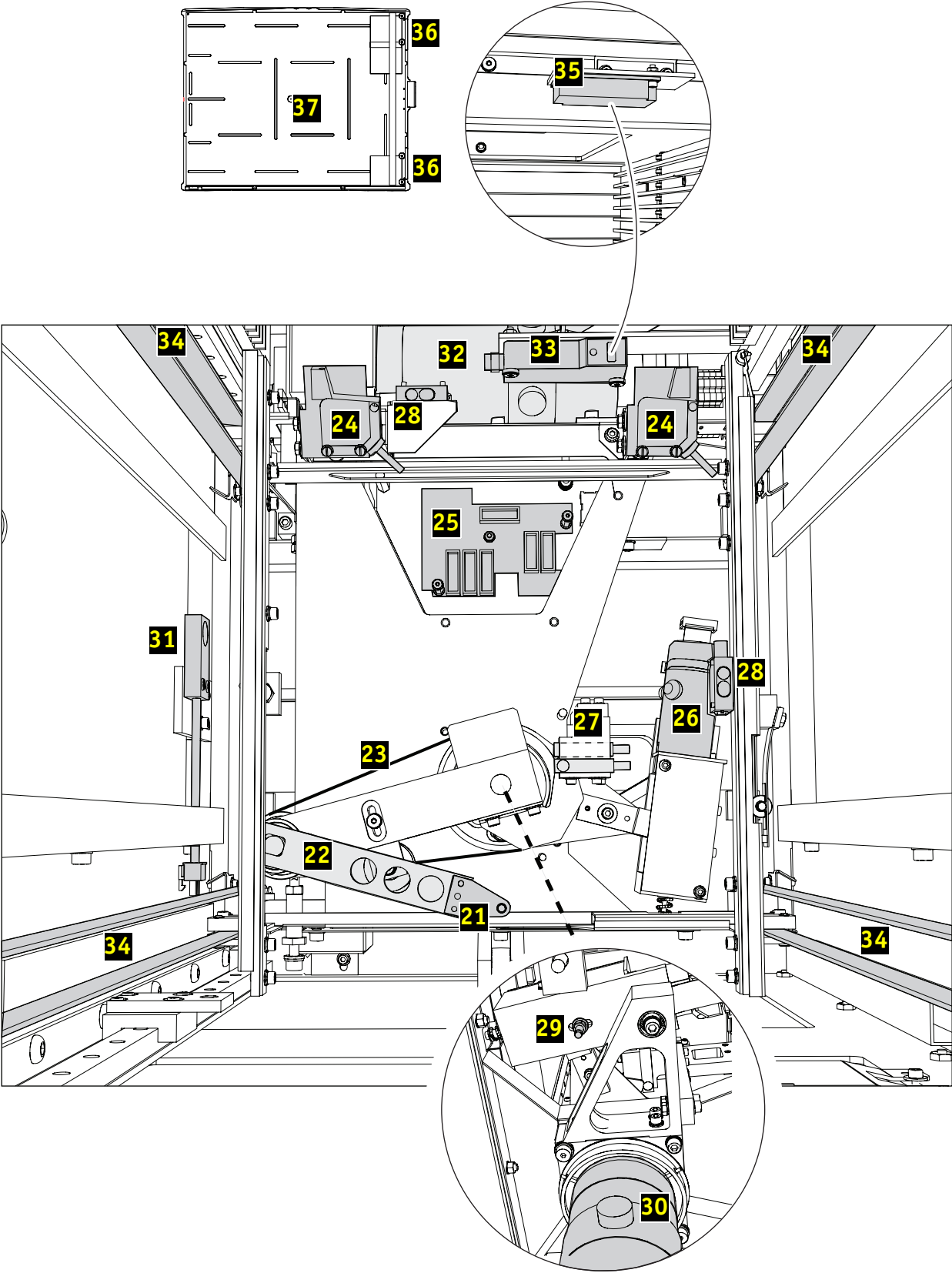
## H8.0.1 Tray trolley, spares

Current spare parts list, see <a href="http://espares.assembleon.com">http://espares.assembleon.com</a>							
Item No.	Part of Item No.	Ordering Code	Description	Qty/ Mod	Priority indicator	Repair options	Replacement Instruction
0	-	9498-396-01282	Tray trolley	1	-	-	PA 2681/00
	-	9498-397-01282	Tray trolley rep.	1	-	-	
1	-	5322-130-10688	Mult.led 24V green	2	-	-	
2	-	9498-396-01392	LED 2.5 V	1	-	-	
3	-	5322-132-00102	Laser sensor	1	Y	-	
4	-	9498-396-00103	Safety Contact AZ 16 ZV	1	-	-	
5	-	9498-396-00166	Foot switch	2	Y	-	
6	-	5322-216-04248	Tray controller	1	Y	1	
	-	9965-000-15027	Tray controller rep	1	-	RO	
7	-	5322-361-10926	Fan	1	-	-	24V dc
8	-	5322-280-10314	Relay 24V DC	1	Y	-	
9	-	9498 396 00162	Fixed wheel	2	-	-	
10	-	9498 396 00161	Swivelling wheel	2	-	-	
11	-	9498 396 00125	Contact pen	3	Y	-	
12	-	9498 396 00167	Connector board	1	Y	-	-



A8-00010.fm

Current spare parts list, see <a href="http://espares.assembleon.com">http://espares.assembleon.com</a>								Remarks
Item No.	Part of Item No.	Ordering Code	Description	Qty/ Mod	Priority indicator	Repair options	Replacement Instruction	
21	-	5322 395 10296	Catch pin	1	-	-		
22	-	9498 396 00163	Crank puller	1	Y	-		
23	-	9498 396 00164	Timing belt, puller	1	Y			
24	-	5322 132 00077	Light sensor	2	Y	-		(B08, B09)
25	-	5322 214 91176	Driver board	1	Y	-		
26	-	5322 361 10923	Snap-in motor	1	Y	-		
27	-	5322 218 11513	EPD	2	Y	-		Stock area (B01, B02)
28	-	9498 396 01277	Light sensor	2	Y	-		(B03, B04)
29	-	5322 210 20337	EPD	1	Y	-		Snap in (B10)
30	-	9498 396 00461	Puller motor	1	Y	-		
31	-	5322 218 11744	EPD Trolley	1	Y	-		(B06)
32	-	5322 361 11047	Lift motor	1	Y	-		RS420j
33	-	5322 132 00074	Laser sensor	1	Y	-		(B05)
34	-	5322 358 10191	Timing belt	4	Y	-		Vertical lift
35	-	5322 380 10146	Reflector	1	Y	-		
36	-	4022 530 08901	Vision marker	-	-	-		
37	-	9498 396 00165	Calibration tray	1	-	-		



A8-00010.fm

## H8.1 Tray trolley controller, replacement

Estimated time to complete [min.]: ?

Required special tools. . . . . -

Required part(s). . . . . **H8.0.1.Tray trolley, spares**

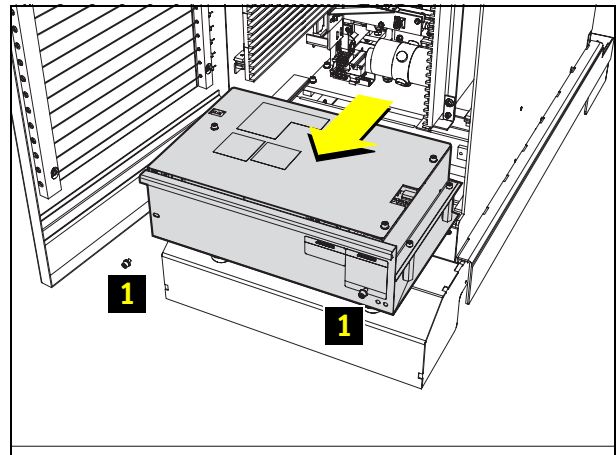
### 1. Prerequisites

- Open the tray trolley door.

### 2. Remove tray trolley controller cabinet

- Remove the two bolts (1) and slide the cabinet out.

**Note:** The sliding distance is restricted by the cable length.

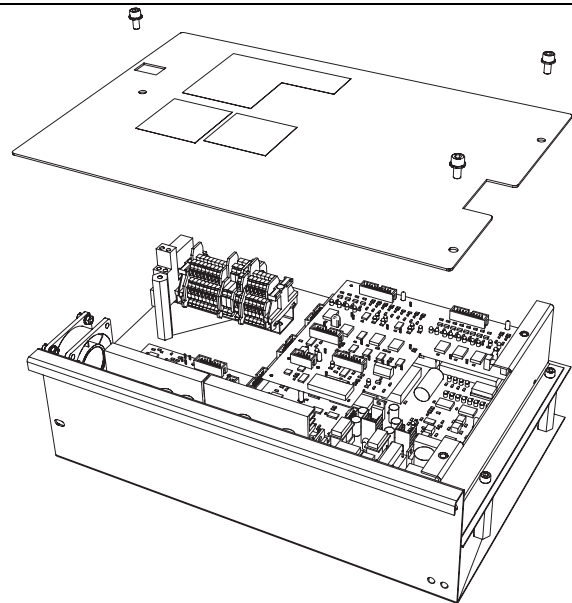


### 3. Removing

- Note jumper X44 setting, see **H5.3 Reference information**
- Identify and disconnect electrical connections;
- Remove the EPROM (unless damaged).

### 4. Assembly

- Remove new EPROM and replace it with the EPROM removed from the old board (unless damaged, in which case leave the new EPROM in place);
- Set Jumper X44 before installing the controller in the trolley.
- Board with new EPROM Software is now downloaded automatically.



### 5. Finalize

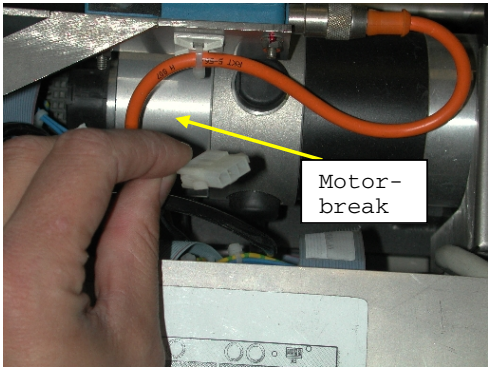
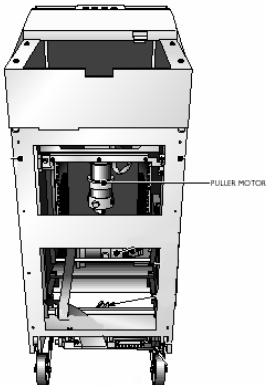
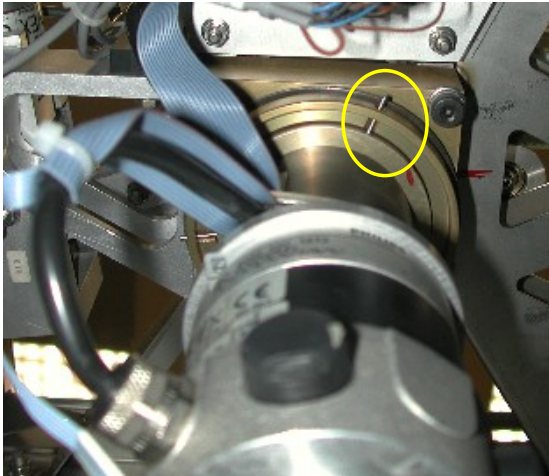
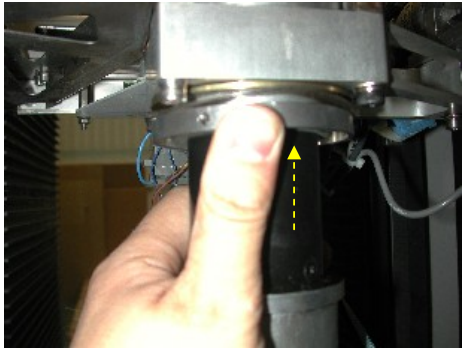
- Calibrate the trolley, see **H6.20 Tray trolley, calibrating**

H8-00002.fm

H8.2 Puller motor, replacement

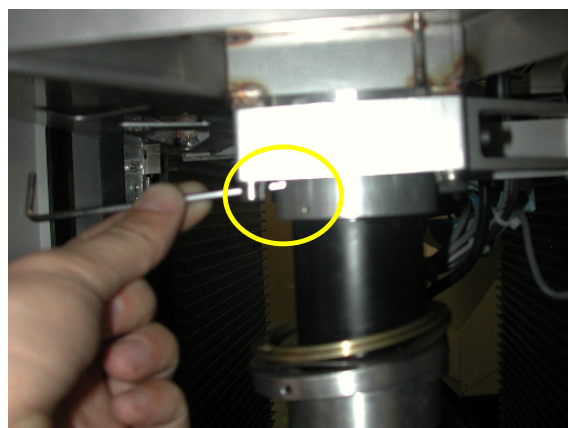
Estimated time to complete [min.]: ?  
Required special tools. . . . . -  
**Required part(s). . . . . H8.0.1.Tray trolley, spares**

To remove the puller motor, the complete puller assembly must be removed. The lift unit must be calibrated afterwards.

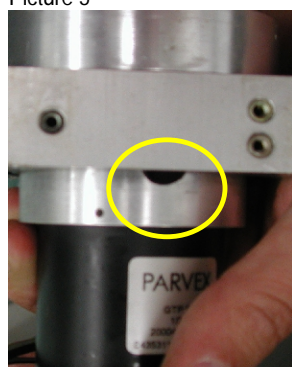
 <p>Picture 1</p>	<p>Release the lift-brake and move the lift to the top position, Releasing the lift-brake can be done by applying 24 volts on the brake of the lift motor or doing this when the Trolley is connected to the machine.</p>
 <p>Picture 2</p>	<p>Remove the front cover of the Tray-trolley</p>
 <p>Picture 3</p>	<p>Remove the Pins (3x) from the puller motor. This is possible by pushing the ring against the spring action. (pins can be reused).</p>  <p>Picture 4</p>

H8-00014.fm

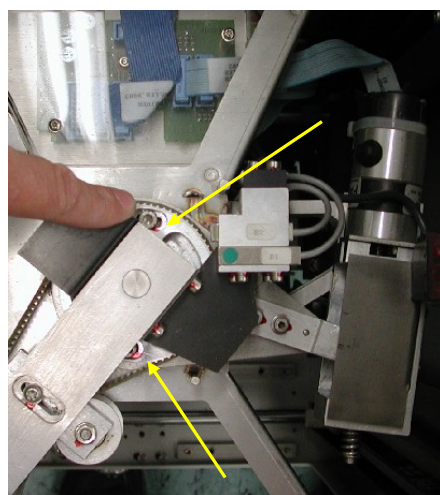




Picture 5



Picture 6



Picture 7

Picture 5:  
Insert allenkey nr3 and release the coupling between motor and the topunit.

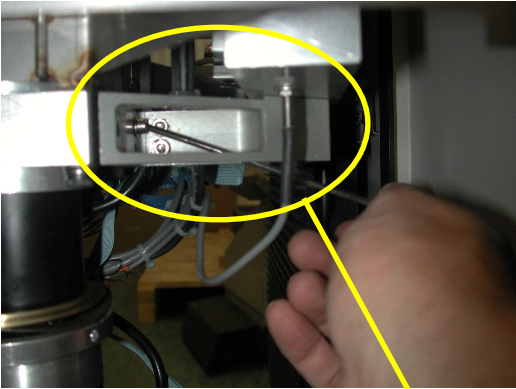

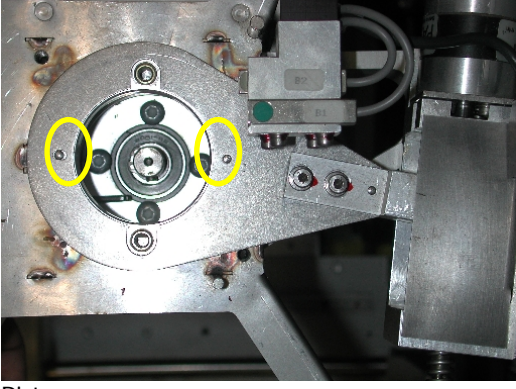
Picture 6:  
Hole in which to insert the allenkey nr3

Release the allenscrews, make sure that the position of the puller is known before you release the screws.

The (Top)-puller unit can be removed now, (tooth-wheel with belt & puller-arms+ coupling)

TIP: make a digital picture before taking the top off, this to make sure that you don't put it back on 180 degr.



 <p>Picture 9</p>	<p>Remove the "snap-in motor" bracket from the puller motor unit (3 allenscrews)</p>
 <p>Picture 10</p>	<p>Remove puller-motor unit 4 allenscrews, (mind the cables with which the motor is connected).</p>
 <p>Picture 11</p>	<p>For remounting; work in opposite sequence, mind that the centre-pins fall in the hole. (in picture 11.)</p>

- Calibrate the trolley, see [H6.20 Tray trolley, calibrating](#)

H8-00014.fm

## H8.3 Lift motor of tray trolley, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

**Required part(s).** . . . . . **H8.0.1.Tray trolley, spares**

**1** describes how to remove the lift motor from the Tray Trolley.

Action	Description	Figure
Remove the controller cabinet from the tray trolley. The controller cabinet is located at the front of the tray trolley.	Open the trolley door. Remove the two bolts at the front of the controller cabinet. <b>Carefully</b> move the controller cabinet out. Remove the two bolts on the right and the bolt on the left of the controller cabinet cover. Remove the cover of the controller cabinet. Now wear an ESD-bracelet. Disconnect all flat cables. Disconnect the motor cable (feedcon X5). Disconnect the bitbus cable (feedcon X8). Disconnect the power cable of the controller cabinet and the tray trolley.	see <a href="#">3</a>
Release the lift motor brake with an external power supply to the motor brake.	Disconnect the lift motor brake connector X1 and apply external power supply of 24 V between pin 1 (+ve) and pin 2 (-ve) on the motor side, to release the brake of the lift motor and re-connect X1 after adjustment (polarity sensitive).	see <a href="#">3</a>
Remove the cover plate at the back of the trolley.		
Carefully pull the lift up to its highest position.		
Place the suspension beams and brackets. Make sure that the brackets' screws are turned completely upwards (outwards) when placing them.	Refer to <a href="#">4</a> , positions A and B to see how the suspension beams and brackets must be placed.	see <a href="#">4</a>
Carefully lower the lift (manually) so that there is a slight tension on the suspension brackets.		
Now enable the lift motor brake again by disconnecting the 24V external power supply.	If slackness occurs, tighten the screw a little.	
Remove the cover over the lift motor belt.		
Both lift axes must remain in the same position in relation to each other. So it is important to prevent movement of the axes.	To prevent movement of the axes:  Mark both the belt and the timing belt pulley of both axes (front and rear) with an indelible marker pen. To be able to do so, it might be necessary to clean the often greasy surfaces with tissue.	For marking the belt and timing belt pulley see <a href="#">5</a>

H8-00011.fm

Action	Description	Figure
Loosen the lock-nut of the belt tension adjuster (1 in 6).		see 6
Turn the belt tension adjuster clockwise (outwards, seen from the front side of the machine) until the belt tension block is completely slack.		see 6
Loosen the two lock bolts (2 in 6) from the lift motor belt tension block.		see 6
Disconnect the lift encoder cable.		
Disconnect the lift motor brake cable.		
Disconnect the lift motor power supply cable.		
If there is a tie wrap, remove it.		
Remove the 4 motor fastening bolts (1 in 7).	It is easiest to remove the lower three bolts first and then the upper one.	see 7
Remove the lift motor.		

Figure 1 Removing the lift motor

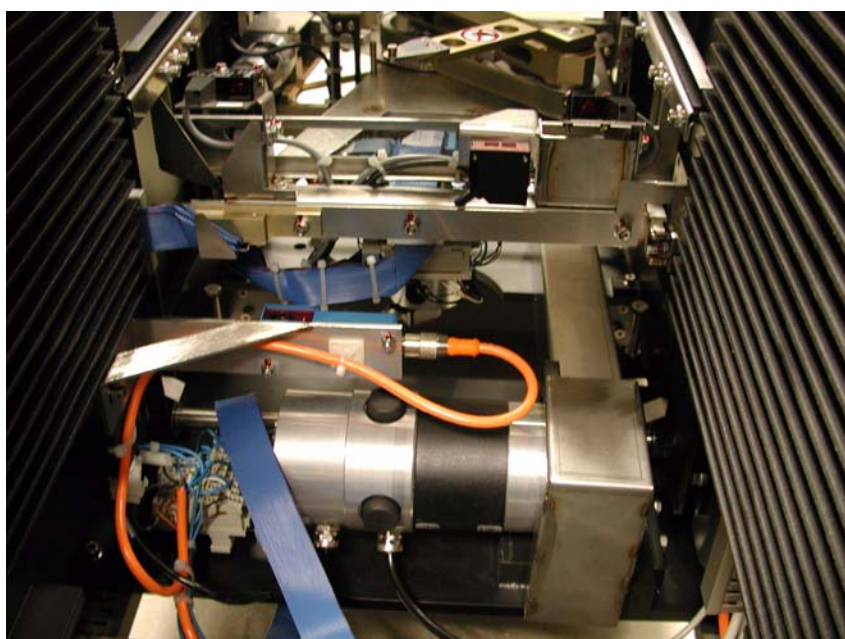
2 describes how to place a new lift motor on the tray trolley.

Action	Description	Figure
Place the lift motor according to 3 for cable positioning.		
Place the motor timing belt pulley through the belt.		
Fasten the motor bolts (1 in 7)	It is easiest to fasten the upper bolt first, then the three lower bolts. Make sure to fasten the bolts well.	see 7
Make sure that the marks on the lift timing belt pulley and belt match.		
Tighten the belt with the help of the belt tension adjuster.	The correct belt tension can be determined with the frequency meter.  However, this is not done until the encoder offset has been checked and found to be OK.	see FIGURE 8A-45
Fasten the lock nut hand-tight.		see 6
Check the marks on the belts and the timing belt pulleys. Reposition the belt if necessary.		see 5
Take care to insert the encoder plug with the cam (1 in 8) facing the lift motor.		see 8
Connect the controller cabinet in the opposite way to removal. Make sure to wear an ESD-bracelet before starting work on the controller cabinet. See FIGURE 8A-85 for cable positions.		

H8-00011.fm

Action	Description	Figure
Before moving the controller cabinet back into the tray trolley, put the cover back on and fasten the screws hand-tight.		
Release the lift motor brake with an external power supply to the motor brake.	Disconnect the lift motor brake connector X1 and apply external power supply of 24 V between pin 1 (+ve) and pin 2 (-ve) on the motor side, to release the brake of the lift motor and re-connect X1 after adjustment (polarity sensitive).	see 3
Move the lift up and remove the suspension beams and brackets.		see 4
Adjust EPD lift up (see section <b>H6.7 EPD B06 in tray trolley, adjustment</b> ).		

*Figure 2 Placing a new lift motor*



*Figure 3 Lift motor*

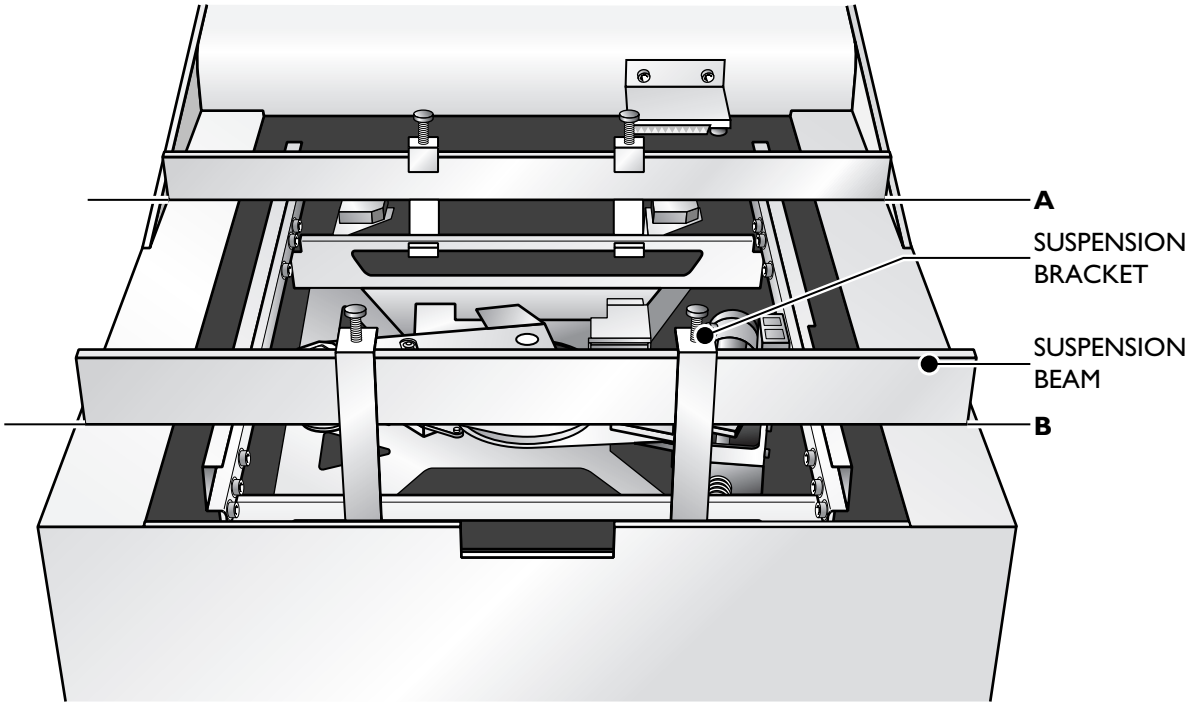


Figure 4    *Placing the suspension beams and brackets (ACM tray trolley shown)*

H8-00011.fm

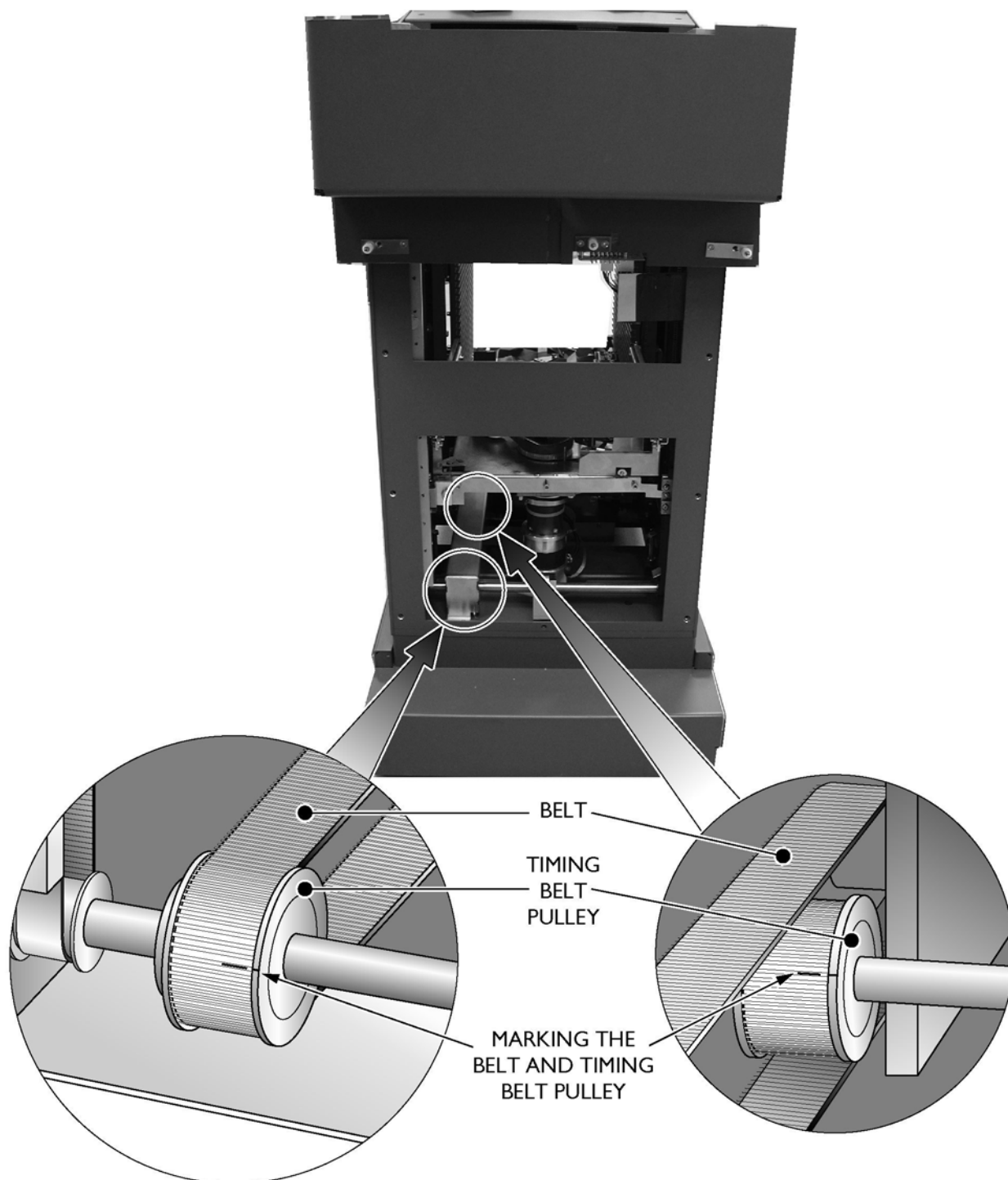


Figure 5 Marking the belts and timing belt pulleys of both axes

SD-158ff.eps

H8-00011.fm



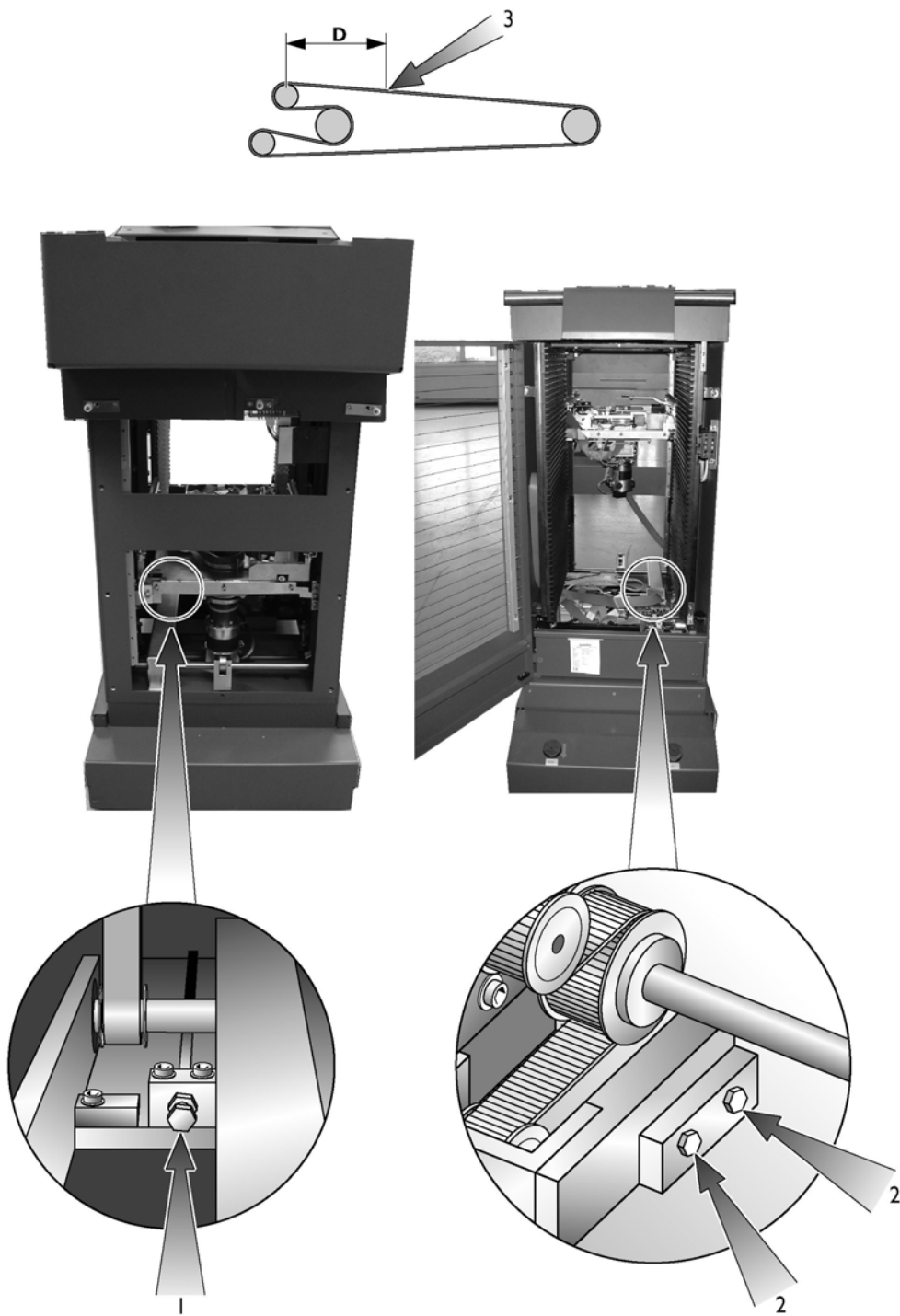
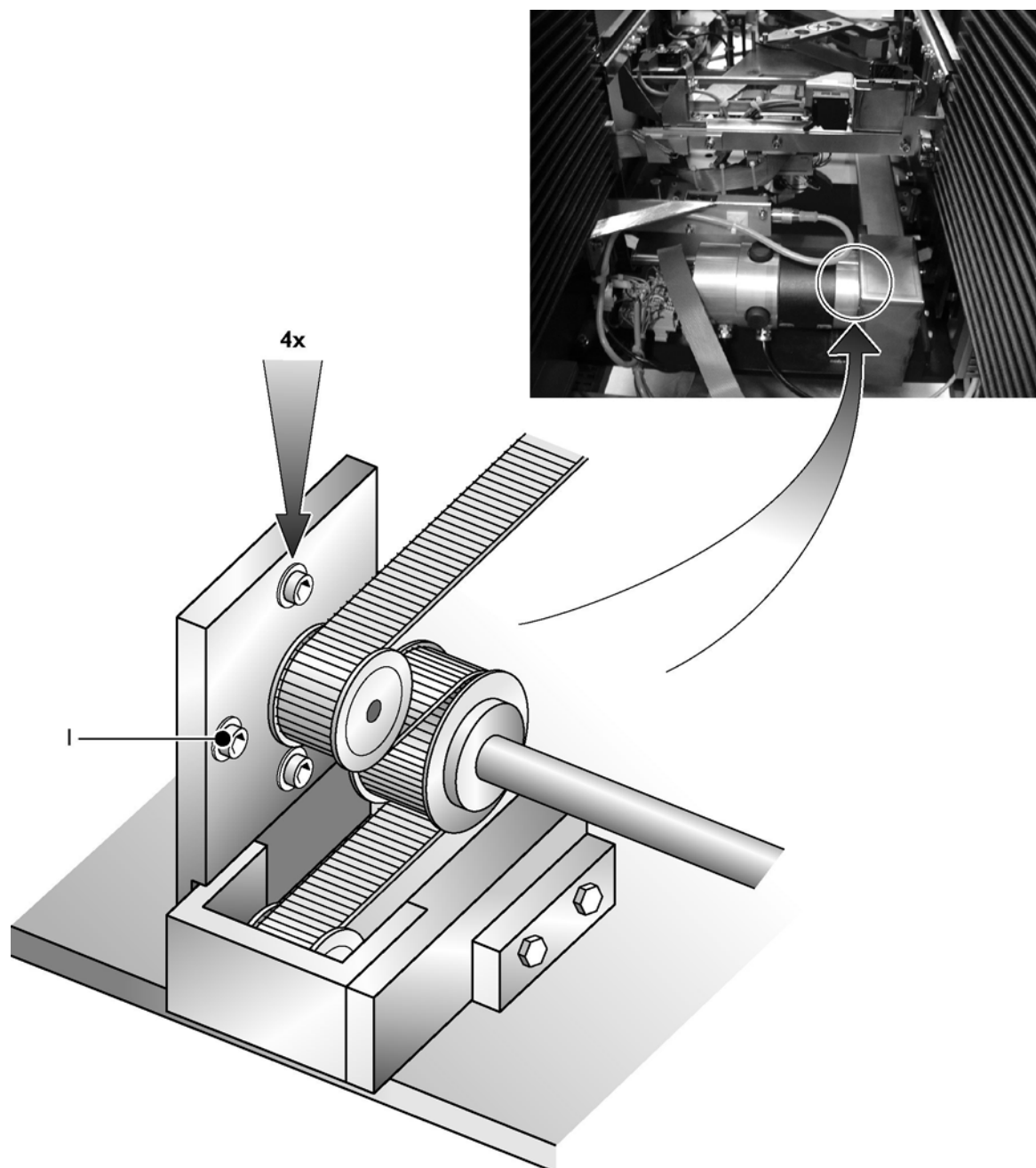


Figure 6 Location of the bolts of the belt tension adjuster

SD-170cc ill7.eps

H8-00011.fm



*Figure 7 Location of the motor fastening bolts*

SD-158g.eps

H8-00011.fm



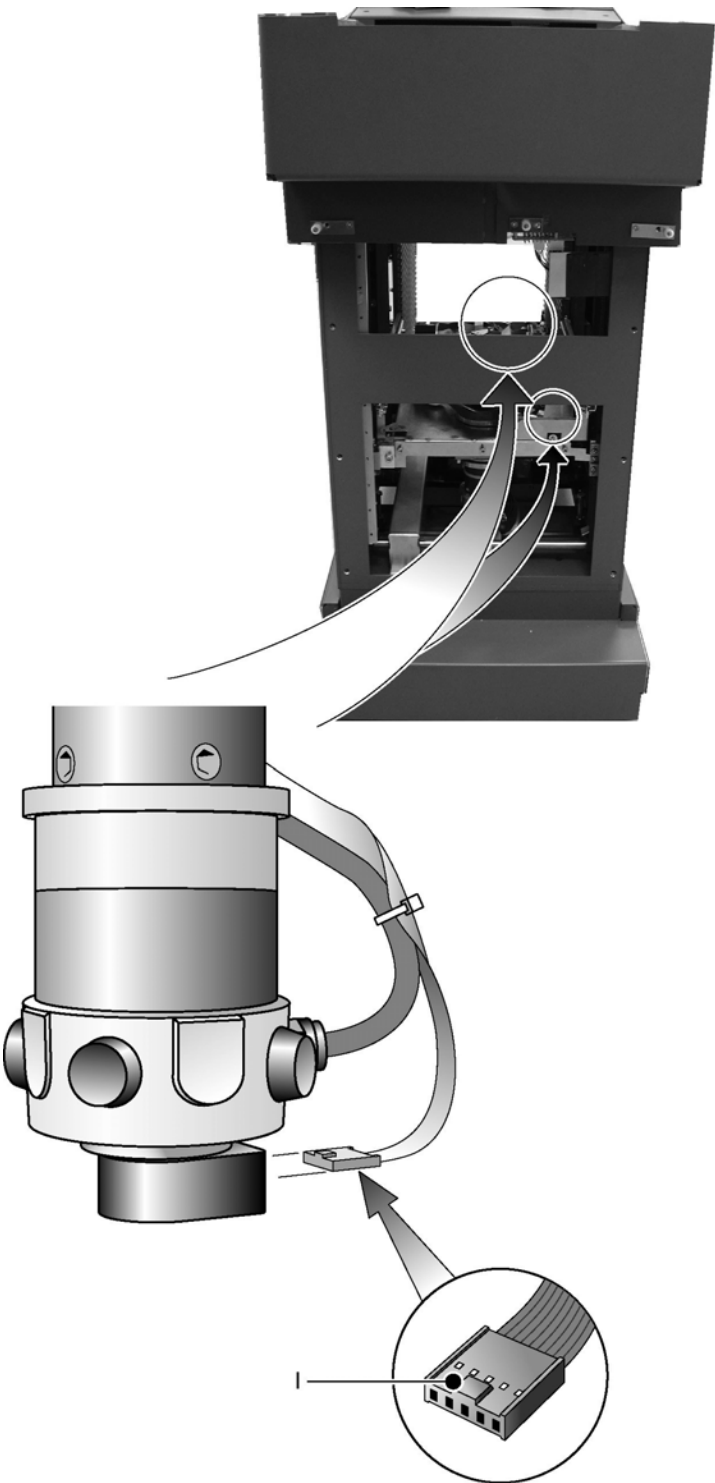


Figure 8    *Inserting the encoder plug*

SD-158mm ill7.eps

H8-00011.fm

## H8.4 Snap-in motor, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

**Required part(s).** . . . . . **H8.0.1.Tray trolley, spares**

9 describes how to remove the snap-in motor/encoder:

Action	Description	Figure
Switch the power off.		
Remove the motor encoder cable.		
Turn the motor axis to locate the very small screw (indicated with '1.' in 11) and loosen the screw with Allen key 0.9 mm.		see 11
Disconnect and remove the motor.		
Remove the square plate.		

*Figure 9 Removing the snap-in motor/encoder*

10 describes how to place a new snap-in motor/encoder.

Action	Description	Figure
Install a new snap-in motor/encoder.	Take care that the distance ('D' in 11) is $1 \pm 0,2$ mm and the square plate is mounted in the original position.	see 11
Adjust the snap-in zero coarse EPD (see section <b>H6.11 Snap-in zero coarse EPD B10 adjustment for 'lock' position</b> ).		

*Figure 10 Placing a new snap-in motor/encoder*

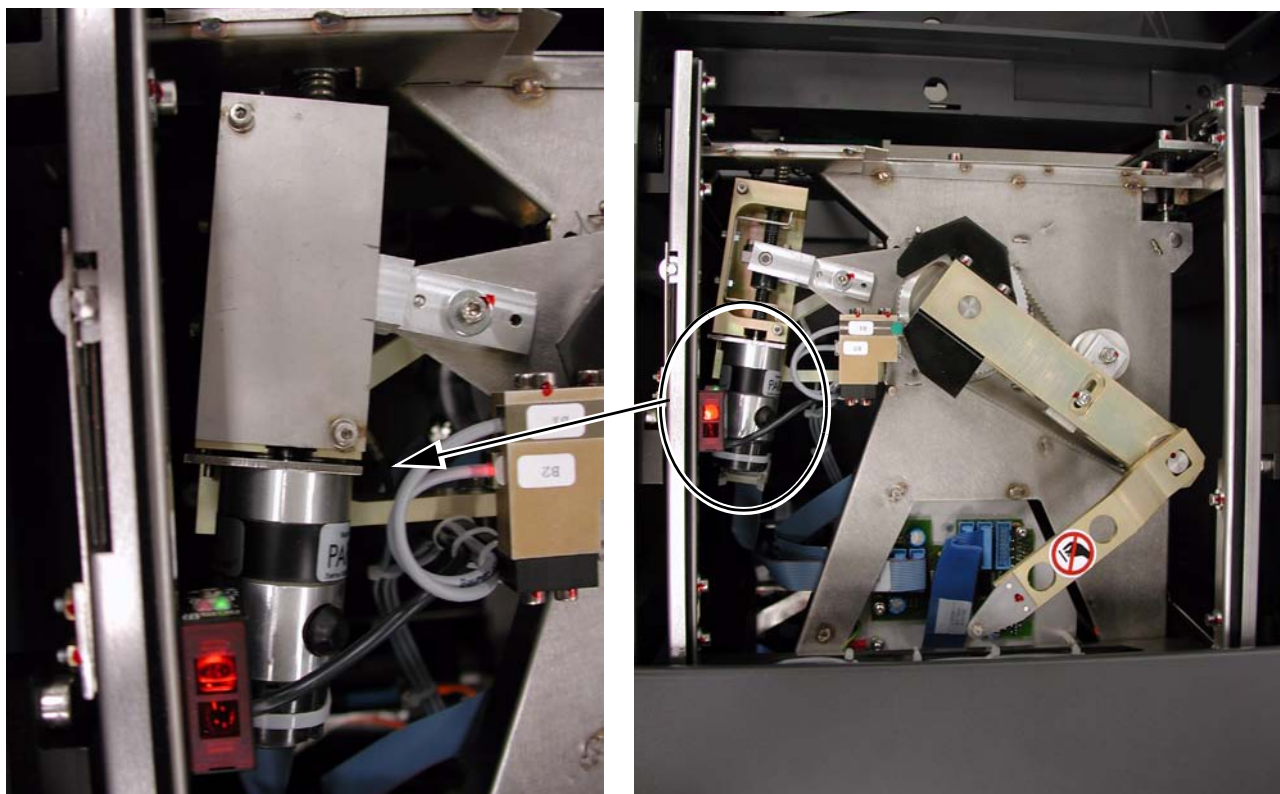


Figure 11 Motor encoder

H8-00012.fm

## H8.5 Drive belt of tray trolley lift, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s). . . . . **H8.0.1.Tray trolley, spares**

### 1. Prerequisites

- 
- 

Release the bottom screws of the four contra-weight guide profiles, M5x10.

Each contra-weight has two guide profiles.

If the contra-weight is in front of the screws move the lift by using the external lift brake.

Put the lift in the up most position by using the external lift brake. Place the lift into four suspension brackets. Place one side of the brackets over the suspension beam and the other side underneath the lift.

3.Remove the controller box.

4.Release the tension of the four vertical belts by loosening the two screws, on the clamping plate left and right, and release the tension screws which can be reached through the holes on top of the trolley frame.

5.Release the tension of the white timing belt by loosening the two hexagonal bolts M6x25 from the clamping block (1), right from the lift motor (seen from the trolley handling site). Now release the tension of the timing belt by loosening the hexagonal screw M6. This is the screw that pushes against the clamping block. The clamping block holds the bracket (2) with the tension-pulley (3) in its place. Completely remove the two hexagonal bolts M6x25.

6.The timing belt can now be removed from the lift motor pulley. Pull the bracket, tension-pulley and clamping block towards you. Remove the clamping block from the bracket by removing the four socket screws M5x12.

7.The tension-pulley can be removed from the bracket by removing the shaft (4). Remove the shaft by using a punch. Watch out for the two spacer rings (5).

8.Remove the lift motor by removing the four socket screws M5x12 from the motor bracket.

9.Remove the four contra-weight guide profiles.

10.Remove the B06 sensor. This step only needs to be performed when the new B06 is installed, see Figure 1.

11.On the bottom of the tray trolley two bearing plates are placed, one on each side. Each bearing plate is mounted on the ground plate with two socket screws M5x20 and to the frame with two socket screws M6x20. Remove these screws and tilt the two main shafts until the left bearing plate (seen from the trolley handling site) can be removed from the ball bearing.

12.In order to remove the bearing plate four socket screws M3x16 (two at each ball bearing) need to be removed.

13.After taking one of the bearing plates the timing belt can easily be removed from the main shaft 1.

H8-00017.fm

### 2.3.2 Placing the new white timing belt

1. Place the timing belt around the tension-pulley (3) so the pulley and belt can be mounted back on the bracket (2). When replacing the shaft (4) make sure there is a spacer ring on both sides of the pulley. Note: Make sure that the belt is placed with the right side up, see figure 1.

2. Mount the clamping block (1) on the bracket by using four socket screws M5x12.

3. Replace the lift motor on the motor bracket with four socket screws M5x12. For the exact cable positions see fig. 7-27, Service Manual release 0101.

4. Place the timing belt around the main shaft 1 (closest to the rear side of the tray trolley). Make sure the timing belt goes underneath the pulley of the main shaft 2 (nearest to the lift motor).

5. Replace the bearing plate over the two bearing at the end of the main shafts and tighten it with four socket screws M3x16 (two at each ball bearing).

6. Place the construction of the bearing plates and the shaft back straight on the bottom of the tray trolley. Make sure that the front side of the bearing plates (seen from the trolley handling side) falls correctly over the dowels.

7. Tighten the bearing plates. Each bearing plate is mounted on the ground plate with two socket screws M5x20 and to the frame with two socket screws M6x20.

8. Mount the sub-assy (consisting of lift motor pulley, bracket and clamping block) on the mounting plate by using the two hexagonal bolts M6x25. The clamping block is mounted on the right block (seen from the trolley handling side) on the mounting plate. This is the block with the two slotted holes. Note: before mounting the sub-assy on the mounting plate make sure the timing is correctly placed on all the pulleys.

9. Replace the four contra-weight guide profiles. Each contra-weight has two guide profiles.

10. Before putting tension on the horizontal timing belt the lift has to be levelled. The main part can be done by rotating the main shaft 1 pulley when holding the belt in its place. This needs to be done visually.

11. Put tension on the horizontal timing belt, so the teeth of the belt can't move over the pulley. Now the lift stays in the same position and the suspension brackets can be removed. In order to remove the brackets the lift brake needs to be released. This can be done with external 24V. Do not remove the suspension beams but turn them 90 degrees. This way the suspension beams are laying flat on their side. After removing the suspension brackets the brake needs to be put back on the lift, make sure the lift is in the up most position.

12. Measure the height between the four lift corners and the suspension beam. When there is still a big difference in height between the front and the rear side of the lift the horizontal timing belt needs to be shifted one more teeth over the main shaft 1 pulley. When this tilts the lift too much, the height difference can be solved by shifting the teeth of the vertical belts over the pulleys. Tension needs to be put on the belts after shifting them.

13. The height difference between left and right can also be solved by shifting the vertical belts. When a small height difference remains, that can't be solved with the vertical belts, the lift can be adjusted with the two metal strips holding the lift up.

After adjusting all belts and putting them on tension the height between the lift corner and the suspension beam needs to be the same for all four corners.

14.Reconnect the controller box.

15.To check if the encoder is in the right position the encoder tester needs to be connected to the lift motor and the brake needs to be released from the lift. Hold the lift in the up most position and slowly move the lift manual down. Mark the height of the contra-weight on the side panel when the first encoder pulse is present. Move the lift further down and check when the B06 sensor is just activated. When the sensor is just activated again mark the height of the contra-weight. Finally move the lift further down till the second encoder pulse is present and mark the height of the contra-weight. The encoder is in the right position when the mark of the activated B06 sensor is in between the two marks of the encoder pulses (see picture below).

16.When there are two encoder pulses before the B06 sensor is just activated or when the sensor is just activated within a distance of 1/4x of the first or second encoder pulse it means that the lift encoder is not in the right position. Rotating the lift pulley can solve this.

17.Before rotating the lift pulley the horizontal belt and both main shaft pulleys need to be marked. Release the tension of the horizontal belt and loose the four socket screws M5x12 on the lift motor so the lift pulley can be rotated.

18.After tightening the lift motor make sure that the lift is straight by checking the marks on the pulleys and belt.

19.When both the lift is straight and the lift encoder is in the correct position the right tension can be put on all the belts. For the horizontal belts the tension needs to be in between 58Hz - 62Hz when measuring by the lift motor pulley (see Figure 14). For the vertical belts the tension needs to be in between 78Hz - 82Hz when the distance from the centre of the bottom pulley till the counter weight is 0.3m (see Figure 14). The tension can be measured with a frequency meter.

20.Calibrate the lift.

•

## 2. Replace drive belt

•

## 3.

- Adjust, see [H6.18 Drive belt of tray trolley lift, adjustment](#)

H8-00017.fm

## H8.6 Puller motor timing belt, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

**Required part(s)**. . . . . [H8.0.1.Tray trolley, spares](#)

---

### 1. Prerequisites

- 

### 2. Replace puller motor timing belt

- 
- 

### 3. Finalize

- Adjust the belt tension, see [H6.19 Puller motor timing belt, adjustment](#)

## H8.7 Vertical timing belt in tray trolley, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

**Required part(s).** . . . . . **H8.0.1.Tray trolley, spares**

### 1. Prerequisites

•

**WARNING:** Do not cut the belt in two

- 1.Put the lift in such a position that it is easy to reach the clamping system
- 2.Mark all pulleys and the vertical belts so that the new belt is easier to replace. Also mark the vertical timing belts where they are being clamped by the clamping system and on the counter weights.
- 3.Release the tension of the belt that needs to be removed and the second belt on the same side. For example when replacing belt 1 release the tension of belt 1 and 3.
- 4.**WARNING:** Make sure that there is a little plate at the bottom of the linear guide. If there isn't a metal plate put a little piece of tape around the bottom of the linear guide so the slide can not fall off.
5. Remove the ball joint from the plate, on the slide of the linear guide, by removing the socket screw M6x20.
6. Remove the cable interface of the puller by removing the socket screws M5x16 and M5x10 and the two socket screws M2.5.
7. Remove the ball joint from the slide of the linear guide by removing the torque screw.
- 8.Loosen the connecting plate from the clamping system by removing the two socket screws M4x10.
- 9.Release the belt from the clamping system. The clamping system consists of one clamping plate, two clamping blocks and two set plates. By removing the four socket screws M4x12 the system can be removed from the belt.
- 10.Release the belt from the counter weight by removing six socket screws M3x12 from the clamping plate. Note: Make sure the belt is marked at the position the belt is being clamped against the counter weight.
- 11.Remove the vertical belt.

#### 2.4.2Placing the new vertical belt

- 1.Mark the new belt. Use the old vertical belt to mark the new belt in the same way. Make sure the new belt has the same length (same amount of teeth). Fold the belt at the position of the marking where the set plate has to be positioned.
- 2.Place the belt around the two pulleys.
- 3.Mount the clamping system on one of the sides of the belt. It is easiest to clamp the topside of the belt first and than the bottom side. Make sure the belt is in the right position according to the marks.
- 4.Clamp the belt against the counter weight, using the clamping plate which can be

H8-00016.fm



mounted with 6 socket screws M3x12. Watch the marks.

5.If the marks on the belt and on the pulleys are not in the same position the belt needs to be shifted over the pulleys until they are the same.

6.Check if the second belt, which has been released of tension, is still in the correct position. If not shift the belt over the pulleys. For example when replacing belt 1 check if belt 3 is still in the correct position.

7.Mount the connecting plate rear back on the clamping plate by using the two socket screws M5x10.

8.1Reconnect the ball joint and the plate on the slide of the linear guide. Make sure the distance between the side of the linear guide and the black guide strip is 4mm  $\pm 0.1$  (see picture).

9.2Replace the cable interface of the puller using the socket screws M5x16 and M5x10 and the two socket screws M2.5.

10.3Reconnect the ball joint and slide by replacing the torque screw. Before tightening the screw make sure the lift guide strip runs parallel to the right guide wall (seen from the handling side). The distance between the back of the guide wall and the lift frame needs to be 65mm.

11.Put tension on the two vertical belts, approximately the same as the two other belts that are still on tension. For example when replacing belt 1 the tension needs to be put on belt 1 and 3 and needs to be equal to belt 2 and 4.

12.Put the lift in such a position that it is easy to measure if it is levelled. This can be done by releasing the brake by using the external 24V.

13.Measure if the lift is standing levelled. If the lift is not straight it needs to be corrected. This can be done either by shifting the teeth of the belt over the pulley or by adjusting the connection plate.

14.When the lift is completely straight the right tension can be put on the belts. The vertical belt tension needs to be 78Hz-82Hz when the distance from the centre of the bottom pulley till the counter weight is 0.3m (see Figure 14).

15.Calibrate the lift.

NOTE: When replacing all four vertical belts it is easiest to remove the entire lift module (lift, puller module and snap-in)

## 2. Finalize

- Adjust, see [H6.17 Vertical lift belt, adjustment](#)

H8-00016.fm

## H8.8 Cranck puller, replacement

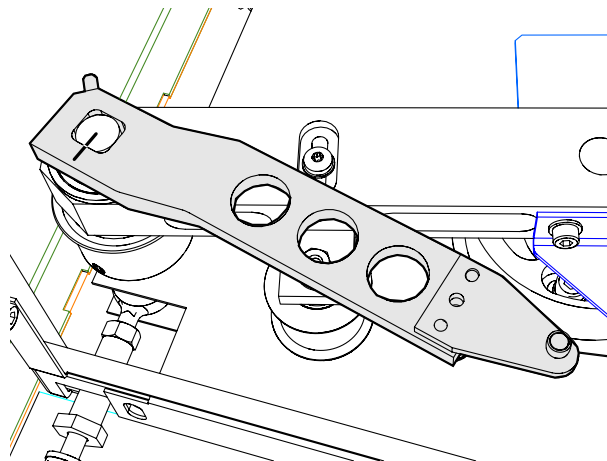
Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s). . . . . **H8.0.1.Tray trolley, spares**

### 1. Adjustment

- Mark position existing cranck puller;
- Remove cranck puller;
- Install a new cranck puller;
- Check height of puller arm tip according to the procedure in section, see **H6.14 Puller arm tip, height adjustment** .



H8-00005.fm

## H8.9 Puller catch pin, replacement

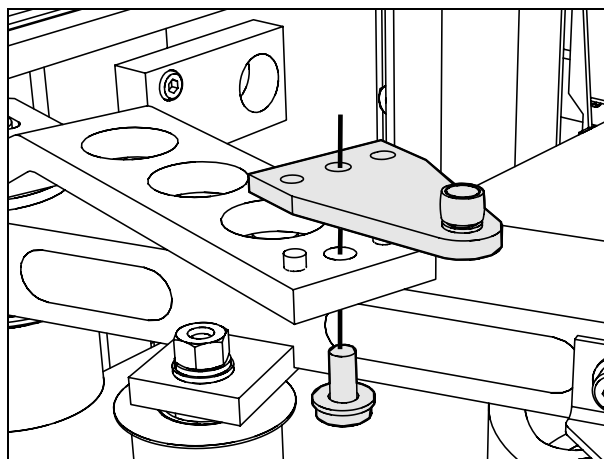
Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s). . . . . **H8.0.1.Tray trolley, spares**

### 1. Adjustment

- Make sure that the two dowels and the screw of the arm do not extrude above the surface of the puller catch pin plate.
- Check height of puller arm tip according to the procedure in section, see **H6.14 Puller arm tip, height adjustment**



H8-00003.fm

## H8.10 Contact pins on tray trolley, replacement

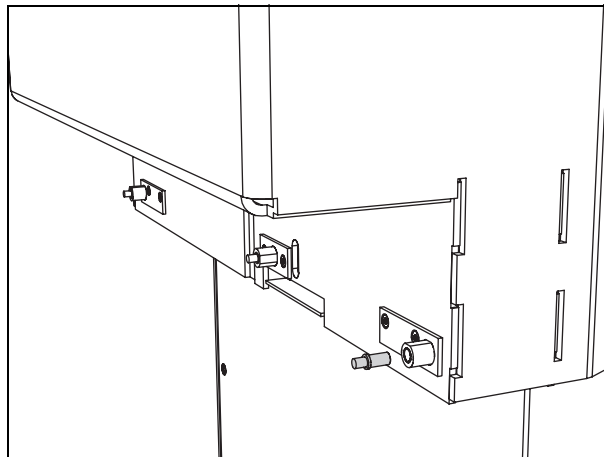
Estimated time to complete [min.]:

Required special tools. . . . .

**Required part(s)**. . . . . **H8.0.1.Tray trolley, spares**

### 1. Replace a contact pin

- Replace a contact pin using pliers.
- Push the new contact pin into the housing.



H8-00018.fm

## H8.11 Trolley interface board, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

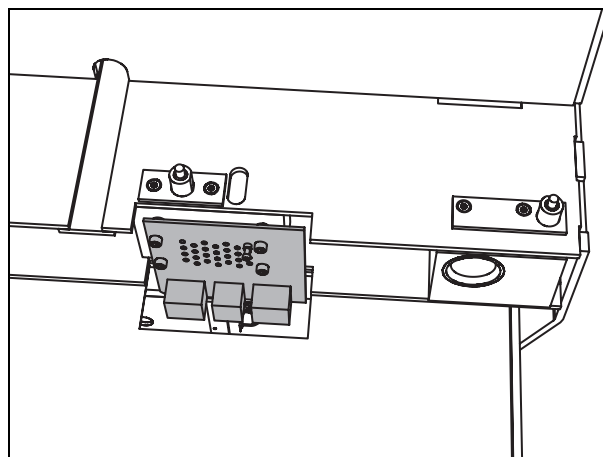
Required part(s). . . . . [H8.0.1.Tray trolley, spares](#)

### 1. Prerequisites

- 

### 2. Replace the trolley interface board

- Remove the four Allen bolts that fasten the board.
- Disconnect all cables to the board.
- Installation in reverse order.



## H8.12 Control LED's on tray trolley, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

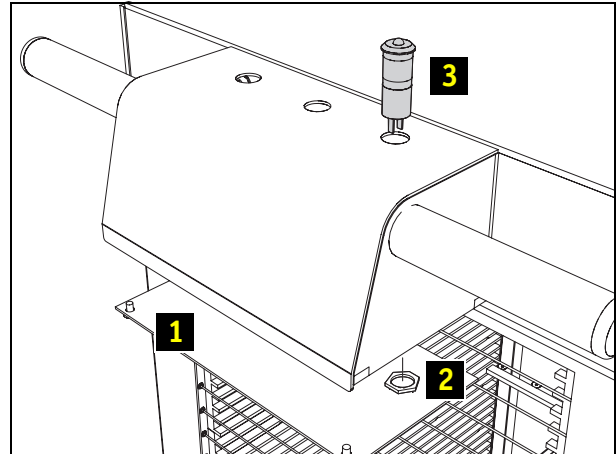
Required part(s) . . . . . H8.0.1.Tray trolley, spares

### 1. Prerequisites

- Power down the machine.

### 2. Replace the control LED

- Remove cover (1).
- Locate concerning LED and disconnect wiring.
- Remove nut (2).
- Take out LED.
- Installation in reverse order.



H8-00006.fm

## H8.13 Driver board of puller motor, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s). . . . . H8.0.1.Tray trolley, spares

### 1. Prerequisites

- Power down the machine.
- Remove cover plate (1).

### 2. Remove driver board

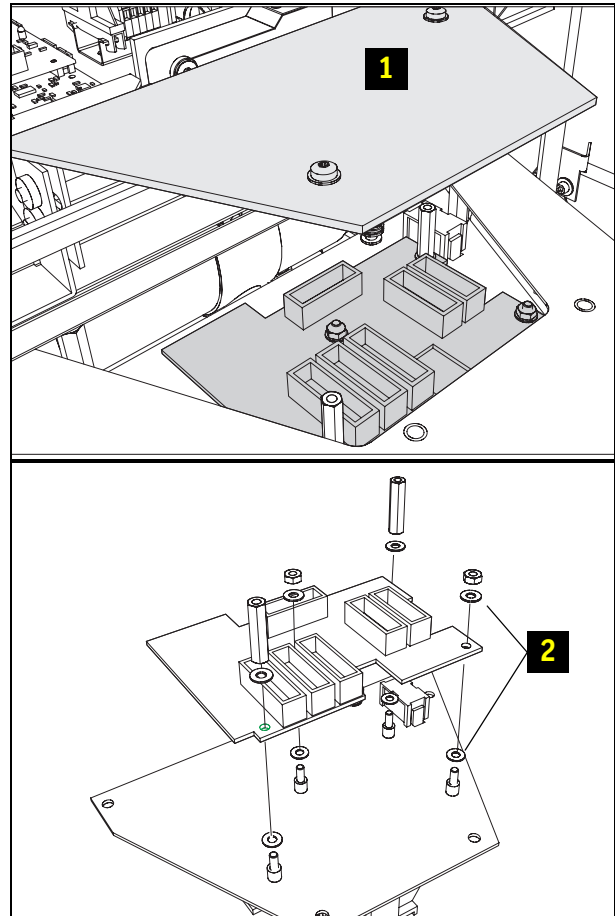
- Remove connectors.
- Loosen studs and screws.
- Take out driver board.

### 3. Install driver board

- Mount the new driver board.
- Apply the isolating fibre washers (2).
- Connect connectors.

### 4. Finalize

- Mount the cover plate (1).



## H8.14 Safety interlock in tray trolley, replacement

Estimated time to complete [min.]: ?

Required special tools. . . . . -

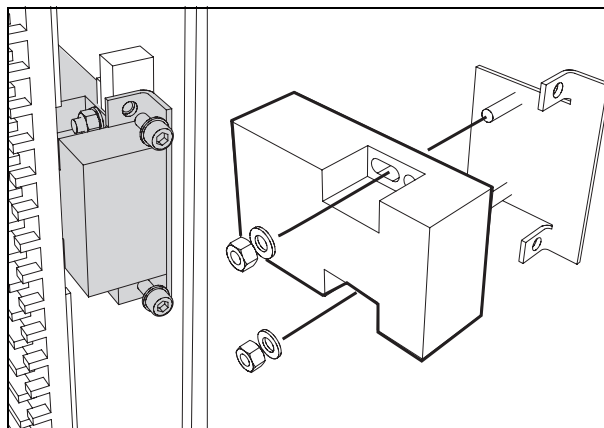
Required part(s). . . . . **H8.0.1.Tray trolley, spares**

### 1. Prerequisites

- Open the front door of the tray trolley.

### 2. Replace safety contact

- Loosen two screws and take safety interlock with bracket out.
- Disconnect wiring.
- Transfer bracket to new safety contact.
- Connect wiring and mount safety interlock.
- Check function.
- Adjust if necessary.





## H8.15 EPD B01, B02 in tray trolley, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

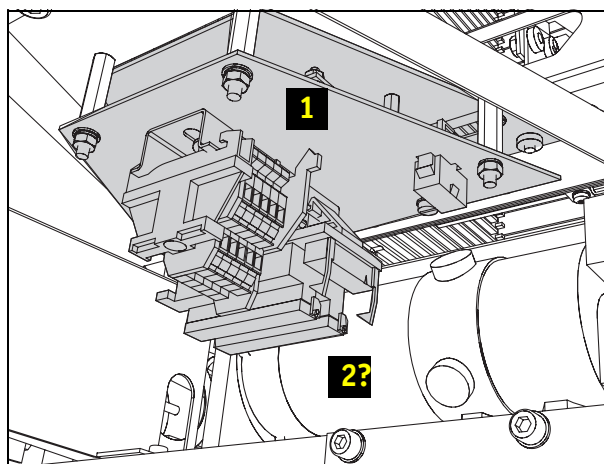
Required part(s). . . . . [H8.0.1.Tray trolley, spares](#)

### 1. Prerequisites

- Power down the machine.
- Remove the cover at the back of the machine.

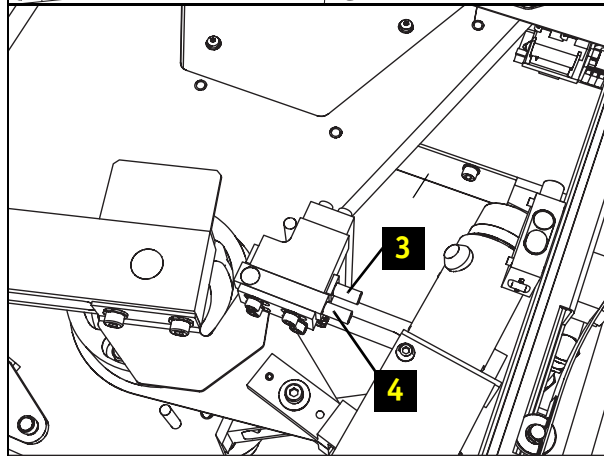
### 2. Remove connector of EPD B01,B02

- Loosen mounting plate driver board (1).
- Cut tie-wrap and locate wiring of concerning EPD (2?).



### 3. Replace the EPD B01, B02

- Loosen the nut and take EPD B02 (3) or EPD B01 (4) out.
- Connect EPD connector (2?).
- Mount mounting plate driver board (1).  
Apply Loctite 232.



### 4. Finalize

- Secure the cables with a tie-wrap
- Adjust EPD B01, see [H6.3 EPD B01 puller in stock area, adjustment](#)
- Adjust EPD B02, see [H6.4 EPD B02, puller safe / puller zero coarse adjustment](#)

H8-00010.fm

## H8.16 Tray carrier sensor B03, B04, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s) . . . . . [H8.0.1.Tray trolley, spares](#)

### 1. Prerequisites

- 
- 

### 2. Distance threshold adjustment sensor B03,

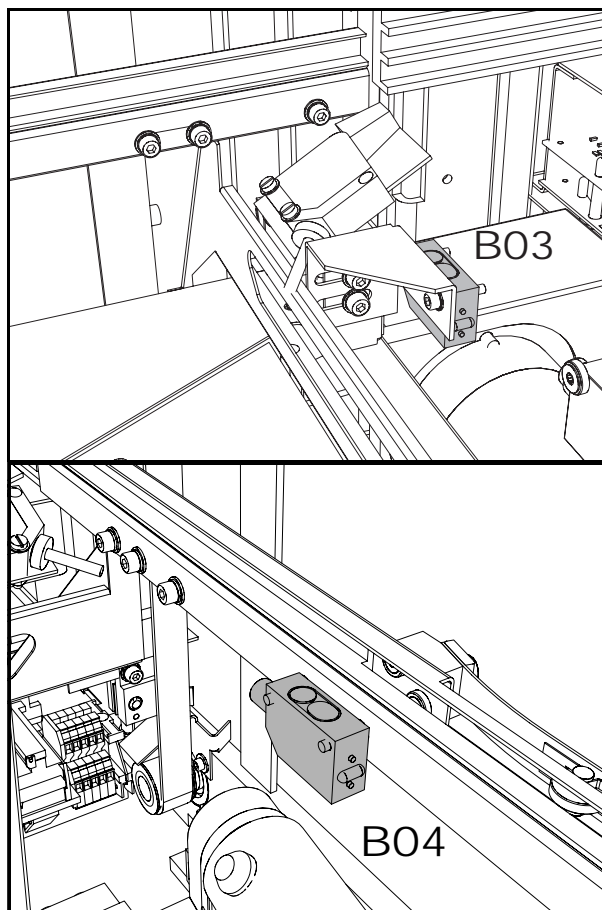
- 

### 3. Sensor position, sensor B03 only

- 

### 4. Finalize

- Adjusting, see [H6.5 Tray carrier sensor B03, B04 adjustment](#)



H8-00007.fm

## H8.17 Laser B05, sensor storage in tray trolley, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s). . . . . [H8.0.1.Tray trolley, spares](#)



LASER BEAM

Looking into it may injure your eyes.

Do not stare into it

### 1. Prerequisites

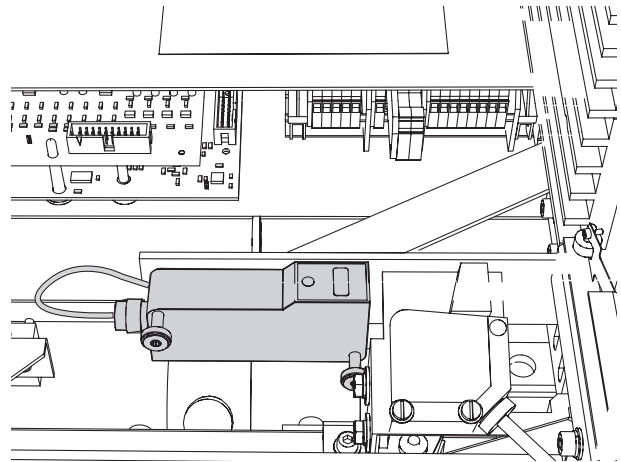
- 

### 2. Replace sensor

- 
- 
- 

### 3. Finalize

- Adjust laser sensor, see [H6.6 Laser B05, sensor storage in tray trolley, adjustment](#)



## H8.18 EPD B06 in tray trolley, replacement

Estimated time to complete [min.]: ?

Required special tools. . . . . ?

**Required part(s).** . . . . . **H8.0.1.Tray trolley, spares**



**NOTE:** The sensor can be mounted in two ways on the tray trolley depending on the status of the trolley. It can either be pointing with the LED up or with the LED pointing towards the storage area. Adjustment of the sensor stays the same.

### 1. Prerequisites

- ?

### 2. Replace EPD (B06)

- In the highest position (with the counterweights against the end stops) the sensor must be activated.

**Note:** To check this there is a small LED (1?) on the sensor.

### 3. Finalize

- Adjust, see **H6.7 EPD B06 in tray trolley, adjustment**
- 



H8-00024.fm

## H8.19 Laser B07, storage in tray trolley, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

Required part(s). . . . . H8.0.1.Tray trolley, spares

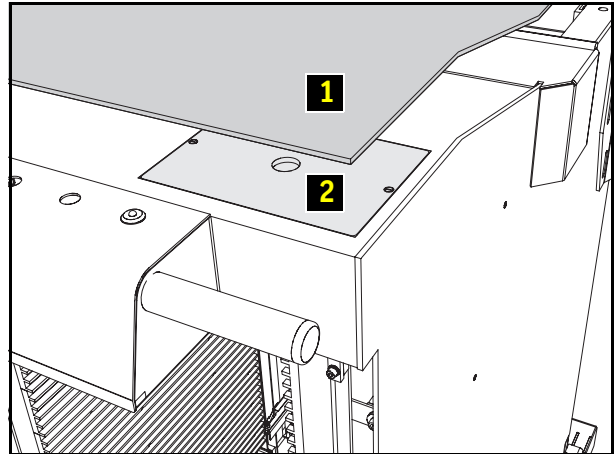


**LASER BEAM**  
Looking into it may injure your eyes.  
Do not stare into it



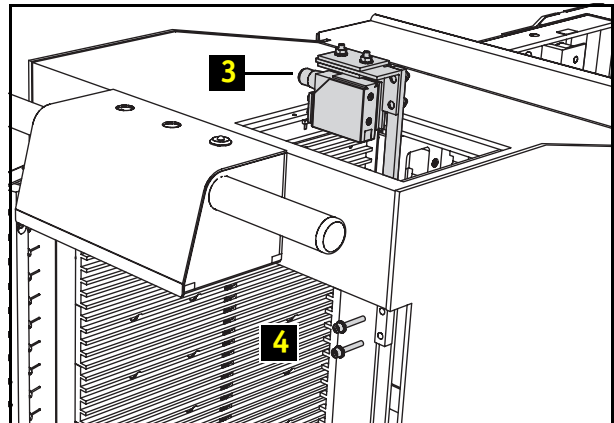
### 1. Prerequisites

- Remove covers (1,2).



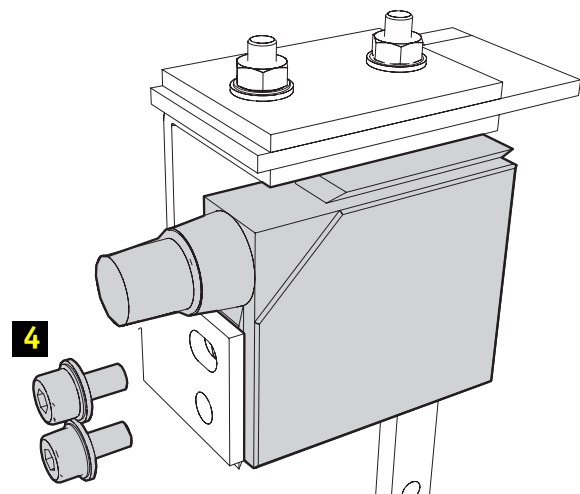
### 2. Remove laser with bracket

- Disconnect wiring (3) of laser.
- Remove the bolts (4) and take bracket with laser out.



### 3. Transfer bracket

- Remove the bolts (4) and take sensor off.
- Position the new sensor according the old one.



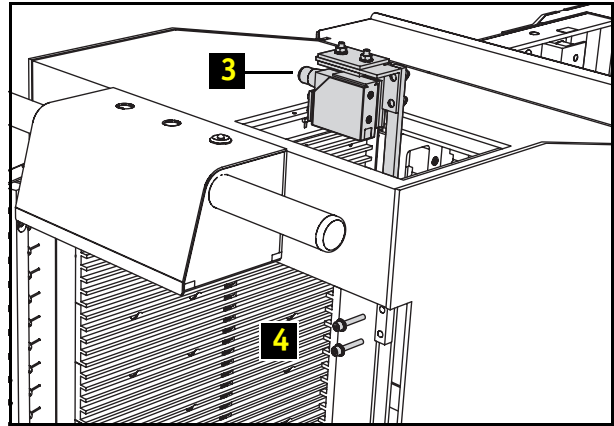
H8-00023.fm

#### 4. Mount laser with bracket

- Connect wiring (3) of laser.
- Install the bracket with laser with the two (4) bolts.

#### 5. Finalize

- Adjustment, see [H6.9 Laser B07, sensor storage in tray trolley, adjustment](#)
- Installation of covers (2,1) in reverse order.



## H8.20 Light sensors B08,B09 in tray trolley, replacement

Estimated time to complete [min.]: . . . . .

Required special tools . . . . .

Required part(s) . . . . . [H8.0.1.Tray trolley, spares](#)

### 1. Prerequisites

- Power down the machine.
- Remove the cover at the back of the machine.

### 2. Remove connector of B08,B09

- Loosen mounting plate driver board (1).
- Cut tie-wrap and locate wiring of concerning EPD (2?).

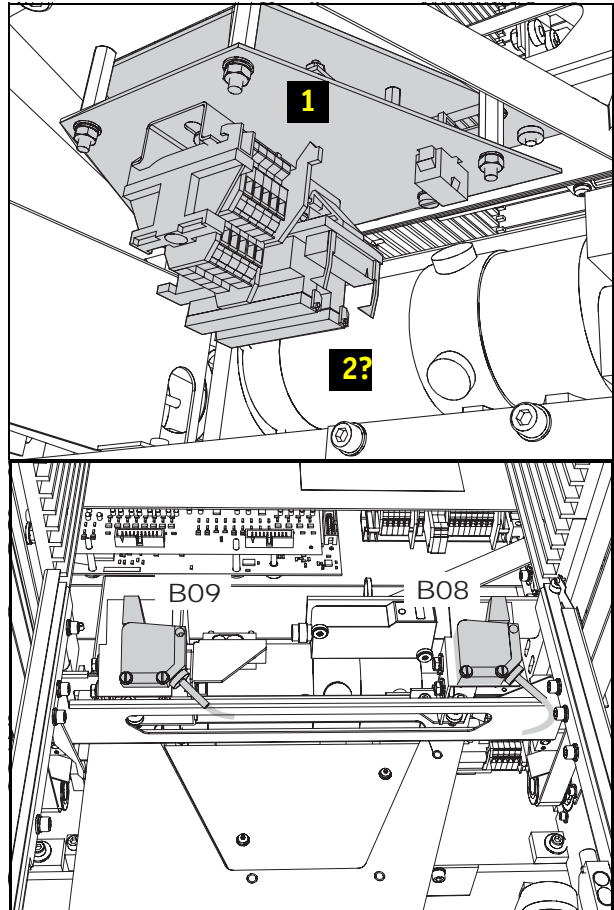
- 
- 
- 
- 
- 
- 
- 

### 3. Replace B08, B09

- 
- 
- 

### 4. Finalize

- Adjust see [H6.10.Light sensor B08, B09, carrier detection adjustment](#)



## H8.21 EPD B10 in tray trolley, replacement

Estimated time to complete [min.]:

Required special tools. . . . .

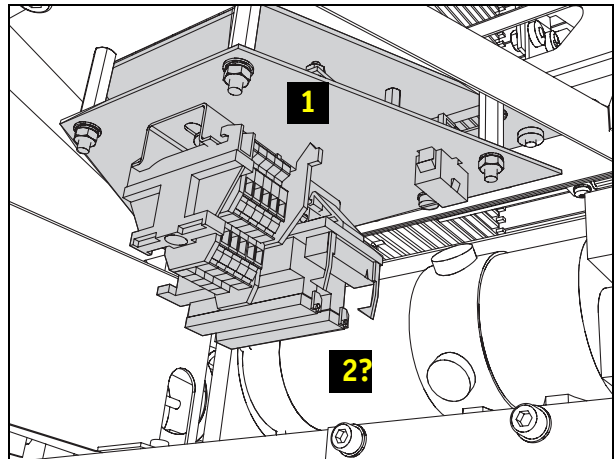
Required part(s). . . . . [H8.0.1.Tray trolley, spares](#)

### 1. Prerequisites

- Power down the machine.
- Remove the cover at the back of the machine.

### 2. Remove connector of EPD B10

- Loosen mounting plate driver board (1).
- Cut tie-wrap and locate wiring of concerning EPD (2?).

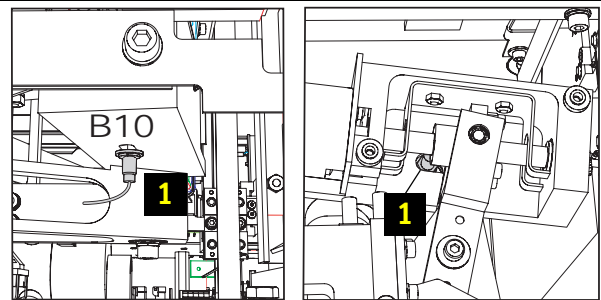


### 3. Replace the EPD B10

- Loosen the nut and take EPD (3) out.
- Connect EPD connector (2?).
- Mount mounting plate driver board (1).  
Apply Loctite 232.

### 4. Finalize

- Secure the cables with a tie-wrap
- Adjust EPD, see [H6.11 Snap-in zero coarse EPD B10 adjustment for 'lock' position](#)



H8-00022.fm



## H8.22 Foot switch of tray trolley, replacement

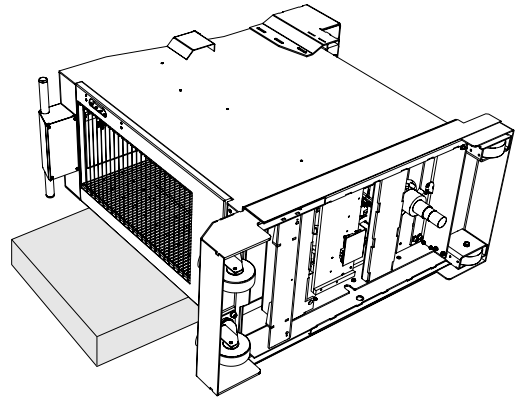
Estimated time to complete [min.]: ?

Required special tools. . . . . -

Required part(s). . . . . [H8.0.1.Tray trolley, spares](#)

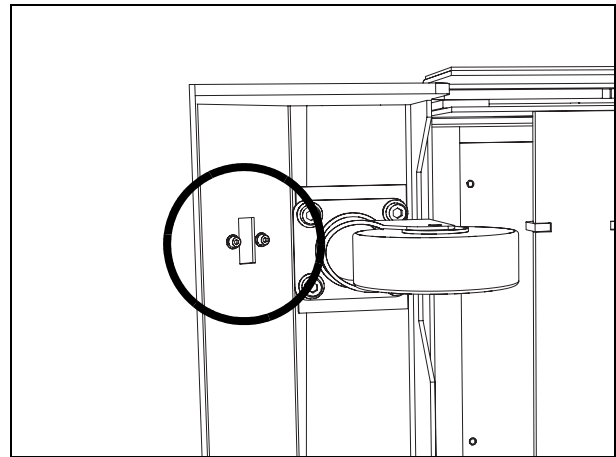
### 1. Prerequisites

- Place the tray trolley on its side on a pallet cart or on two wooden bars (prepare the surface so the that the trolley doesn't get scratched).



### 2. Replace the trolley foot switch

- Cut the tie wraps that keep the foot switch cable in place.
- Remove the foot switch (2 Allen bolts and 1 cable).
- Installation in reverse order.



## H8.23 Wheels under tray trolley, replacement

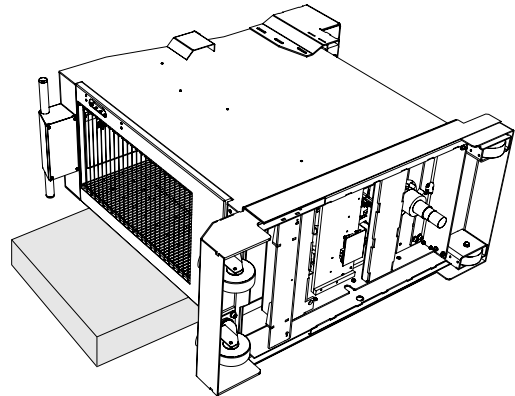
Estimated time to complete [min.]: ?

Required special tools. . . . . -

Required part(s). . . . . **H8.0.1.Tray trolley, spares**

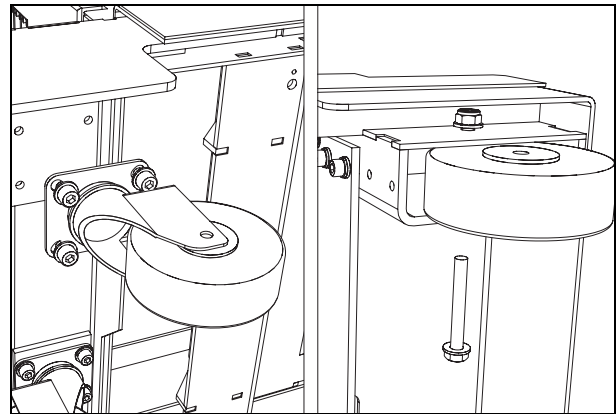
### 1. Prerequisites

- Place the tray trolley on its side on a pallet cart or on two wooden bars (prepare the surface so the that the trolley doesn't get scratched).



### 2. Replace the trolley wheels

- Remove the (swivelling) wheels.



H8-00021.fm